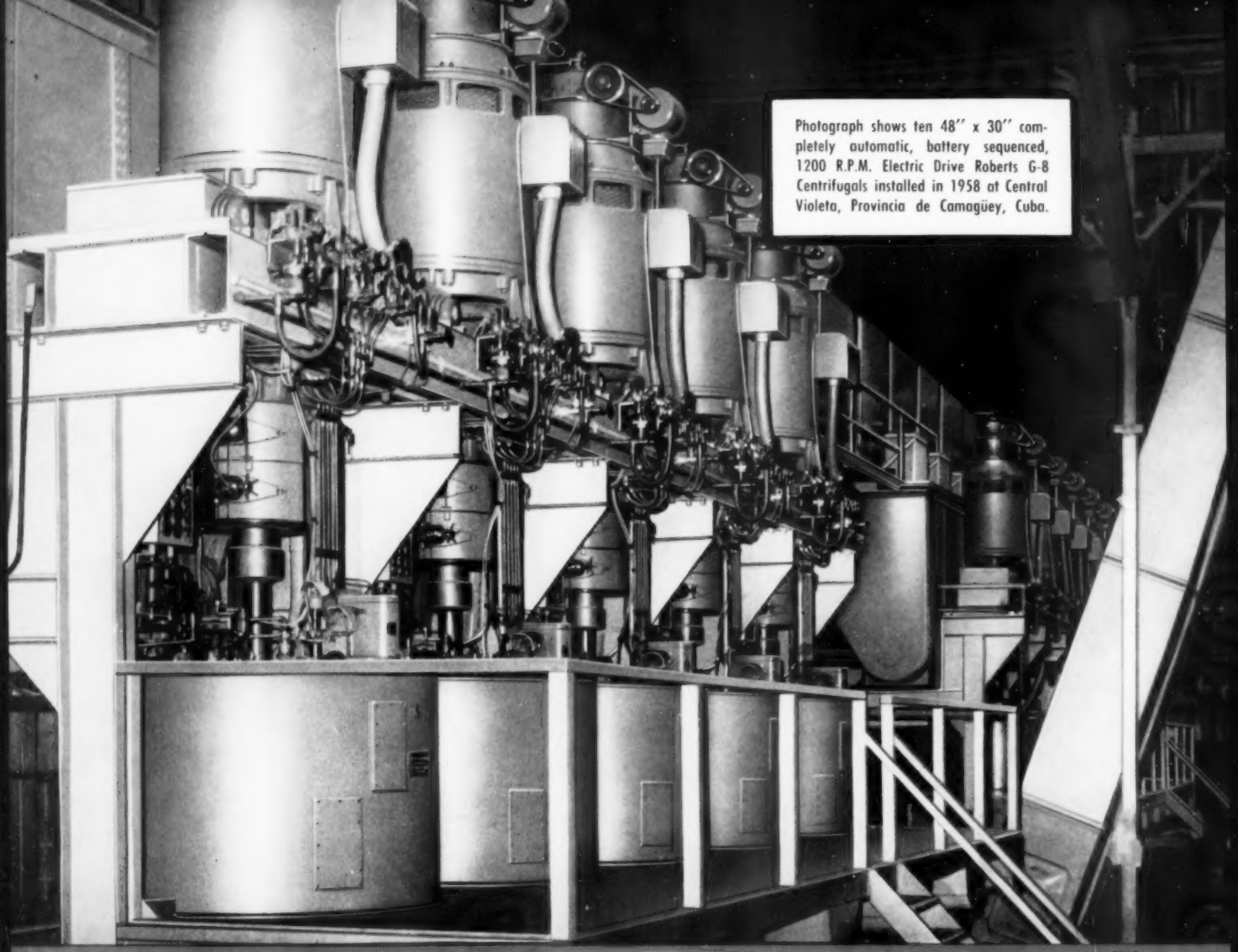
SEPTEMBER 1959

SUGAR Y AZUCAR

FIVE DOLLARS PER YEAR • FIFTY CENTS PER COPY



Photograph shows ten 48" x 30" completely automatic, battery sequenced, 1200 R.P.M. Electric Drive Roberts G-8 Centrifugals installed in 1958 at Central Violeta, Provincia de Camagüey, Cuba.

2810

BEST BUY . . .

Roberts Centrifugals

Consider this fact — "The installed cost of centrifugals, measured against operational savings, determines the true value of the installation and discloses the rate of capital recovery."

For QUICKEST RECOVERY consider these facts which make ROBERTS YOUR BEST BUY.

Built by sugar centrifugal specialists.
Designed to meet the most rigorous centrifugal duty. Round-the-clock sugar purging.
Operational functions all established by sugar factory knowledge, with "Best Buy" results the prime determinant.
Supplied by an organization with experience, and a single objective — better centrifuging for sugar.

THE WESTERN STATES MACHINE COMPANY

HAMILTON • OHIO • U.S.A.

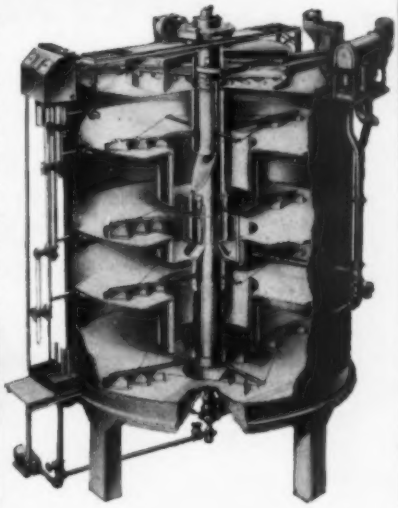
BEST BUY . . . Roberts Centrifugals

For Efficient, Economical Sugar Manufacture

RapiDorr Clarifiers

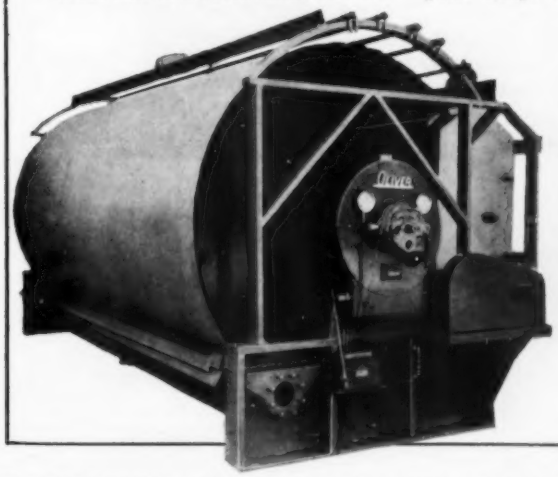
The RapiDorr Clarifier is a *high capacity* unit that allows faster processing of hot thin juice with consequent reduction in losses. It handles equivalent tonnages and achieves comparable results with *30% less volume*. The RapiDorr Clarifier design can be applied to existing units and working capacity can be *greatly increased* at moderate cost. Bulletin No. 4092 gives the complete story.

Write for your copy.



Oliver-Campbell Cane Mud Filters

Designed for long life and economical operation, Oliver-Campbell Filters incorporate the latest filtration developments resulting in efficient, low cost cane mud washing. Operating advantages include — less inversion of sucrose and less re-solution of impurities, higher purity filtrate, cleaner, more compact filtration station and accurate accounting of sucrose recovery. Hundreds of Oliver-Campbell Filters are used throughout the world. Bulletin No. 4093 gives the complete story. Write for your copy.



CANE SUGAR DIVISION • DORR-OLIVER INCORPORATED • STAMFORD, CONNECTICUT

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SUGAR y AZUCAR

Volume 54 No. 9 September, 1959

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COVER *Annual transportation of 55 million tons of sugar, frequently for thousands of miles from remote sources of supply to urban centers of consumption, involves many varieties of handling. Our artist, Jack Brown, has endeavored to suggest the massive nature of the task by depicting a detail of the familiar cargo hoist swinging bagged raw sugar aboard a vessel in a distant tropical harbor.*

PORTADA *El transporte anual de 55 millones de toneladas de azúcar, frecuentemente desde puntos remotos de producción a miles de millas distantes de los centros urbanos de consumo, implica múltiples y diversos medios de manejo. Jack Brown, nuestro dibujante, ha tratado de ilustrar la naturaleza y alcance de esta enorme empresa, presentando un detalle de la bien conocida grúa de muelle cargando azúcar crudo abordo de un buque en un puerto tropical.*

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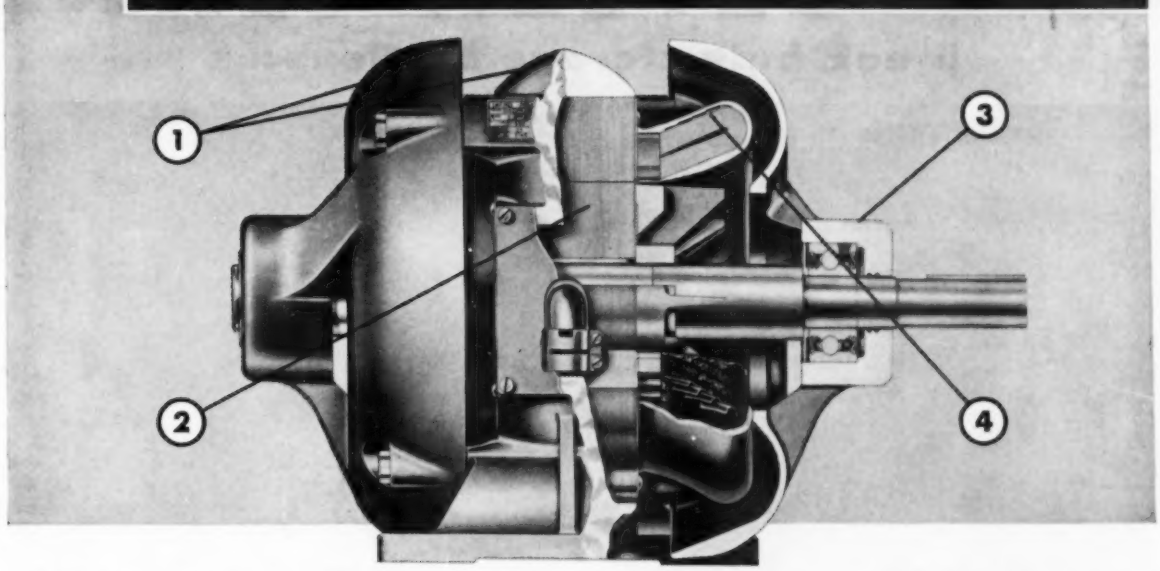
More Westinghouse developments for industry



These features keep Westinghouse motors on the job longer

Most motors deliver the power their specifications promise...for a time. Only after prolonged operation can you pick out the superior motor. It is still delivering rated power without strain. It costs no more to maintain than when new. More often than not, it bears a Westinghouse nameplate.

Whether it is a 75-hp motor driving an industrial blower, or a fractional-hp motor in an office fan, you can credit the trouble-free performance of Westinghouse motors to design features like these:

1 Heavy one-piece frame is cast iron for extra strength and rigidity.

2 Rotor is dynamically balanced for smooth, vibration-free operation.

3 Precision ball bearings have *four* seals—two on each side. Prelubricated with new synthetic grease that outlasts the bearings.

4 Exclusive fortified insulation system lengthens motor life by protecting against heat, oil and moisture.

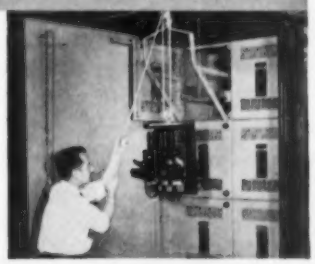
If you want more horsepower in less space at lower cost ...reliable service with practically no maintenance... a Westinghouse motor is the answer. Write for "Booklet 8-Y" on Life-Line "A" motors (1 to 30 hp.) or "Booklet 81-A" on fractional motors (1/20th to 1 hp.).

For more information on the Westinghouse developments shown here or help on specific engineering problems, write Westinghouse Electric International Company, Box 345, Wall Street Station, New York 5, U.S.A.

De-ion® quenches arc faster to give breakers longer life

The Westinghouse-developed De-ion® principle, an important feature of Westinghouse circuit breakers, quenches the arc in approximately 1/2 cycle. This means reduced pitting which assures longer contact service. Your Westinghouse distributor can supply units for excessively dusty, wet, explosive or corrosive conditions. For complete information, ask for "Booklet 8-W."

This switchgear rates high with maintenance men



Easy to install (simple connections) and easy to service (draw-out De-ion® circuit breakers) is Westinghouse low-voltage metal-enclosed switchgear. Twelve factory-assembled standardized units eliminate your engineering cost, yet meet all normal switchgear requirements. Maximum voltage: 600 a-c. Write for "Booklet 8-X."

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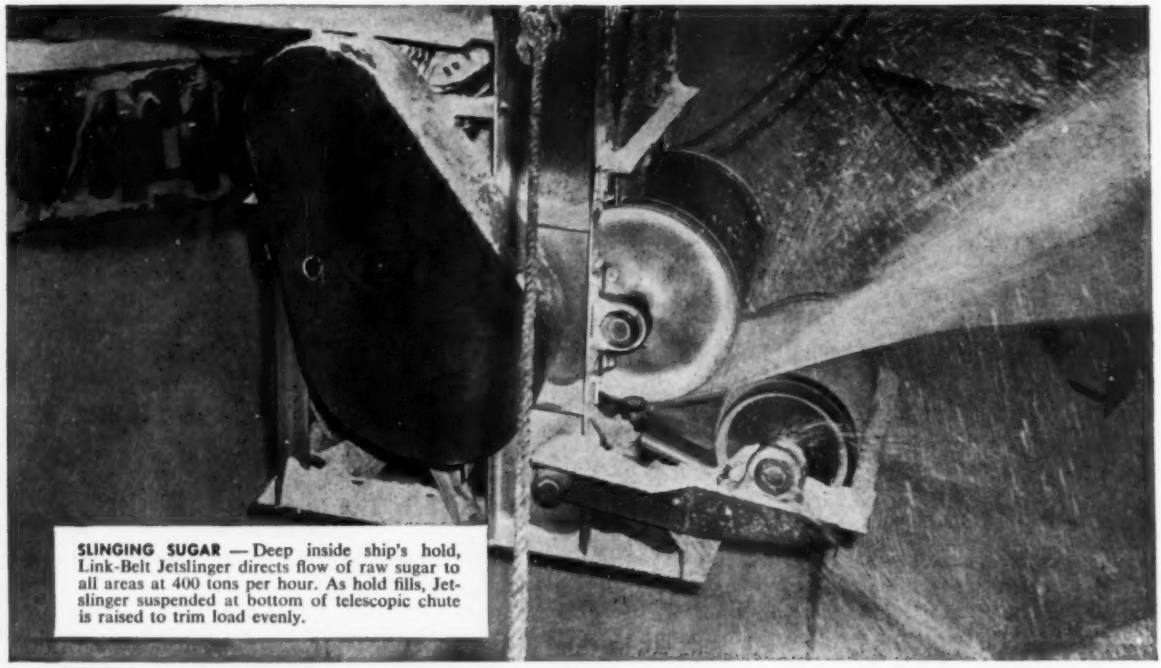
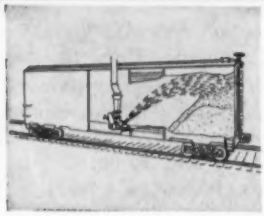
LINK-BELT JETSLINGERS

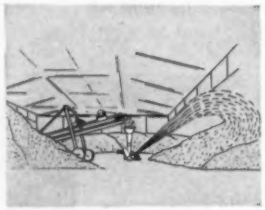
break bulk storage bottlenecks



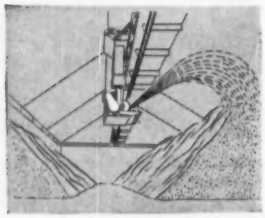
SLINGING SUGAR — Deep inside ship's hold, Link-Belt Jetslinger directs flow of raw sugar to all areas at 400 tons per hour. As hold fills, Jetslinger suspended at bottom of telescopic chute is raised to trim load evenly.



BOX CARS. Jetslinger loads boxcars quickly, slinging material to far corners of the car. Up to 700 tph can be handled.



WAREHOUSES. Jetslinger can be combined with a portable belt conveyor to direct materials to any desired area. Throws material up to 90 feet.



SWIVEL-TYPE, trolley-mounted Jetslinger receives material from belt conveyor. Swiveling allows Jetslinger to fill areas between piles.

Distribute, store and load bulk material beyond normal range of conventional chutes

Four Jetslingers that hurl raw sugar from a Link-Belt belt conveyor into storage—and into the hold of a ship—have helped make Sugar Service Corporation's San Juan (Puerto Rico) sugar-loading operation fast and dependable.

Readily portable, Link-Belt Jetslingers discharge such free-flowing bulk material as sugar, sand and grain by centrifugal force in any direction around an arc of 360°. With the trajectory angle of the stream easily adjusted to reach otherwise inaccessible areas, warehouse or cargo space is filled completely and evenly in a fraction of the time ordinarily needed . . . with much less manual attention.

Design flexibility of this installation emphasizes Link-Belt's "one-source—one responsibility" service for all industries and their bulk handling needs. A complete line of conveyors, power transmission machinery plus a wide range of processing equipment is coupled with expert engineering to assure low per-ton handling costs . . . regardless of your material. For further facts, contact your Link-Belt representative or write for details.

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for materials handling,
processing and power transmission machinery

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EXCLUSIVE DISTRIBUTORS OF SUCHAR ACTIVATED CARBON AND FAS-FLO FILTERS FOR THE CANE SUGAR INDUSTRY

Big Load Capacity The model H-25 "PAYLOADER" tractor-shovel has a carry capacity of 2,500 lbs. — carries more for its weight than any machine in its class.

More Digging Power Breakout force of 4,500 lbs. is available at the bucket cutting edge — more than on any machine near its size. Exclusive power-transfer differential makes traction and "crowding" power more positive, especially when traction conditions are slippery.

More Maneuverable Shortest turning radius (only 6 ft. at rear wheel hub) and power-steer make it possible to operate in closer quarters with greater speed and safety.

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Lower Maintenance The boom and bucket mechanism is of rugged, simple design with fewer parts and linkages. Quality materials are used throughout, including anti-friction bearings at critical pivot points.

Longer Life The most complete system of protection has been engineered into the Model H-25 to insure long life and freedom from trouble: triple air cleaning system for the engine; cartridge-type filters for all three oil systems; self-adjusting, sealed hydraulic brakes; closed, pressure-controlled hydraulic system; grease and oil seals on all pivots and ball joints.

"PAYLOADER" tractor-shovels are sold and serviced in the U.S. and Canada by franchised Hough Distributors—in the export market by the Construction Equipment Distributors of International Harvester Export Co.

THE FRANK G. HOUGH CO., 881 Sunnyside Ave., Libertyville, Ill.

Send data on H-25 PAYLOADER and Attachments

Larger models up to 12,000 lb. carry capacity

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Company _____

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City _____ State _____

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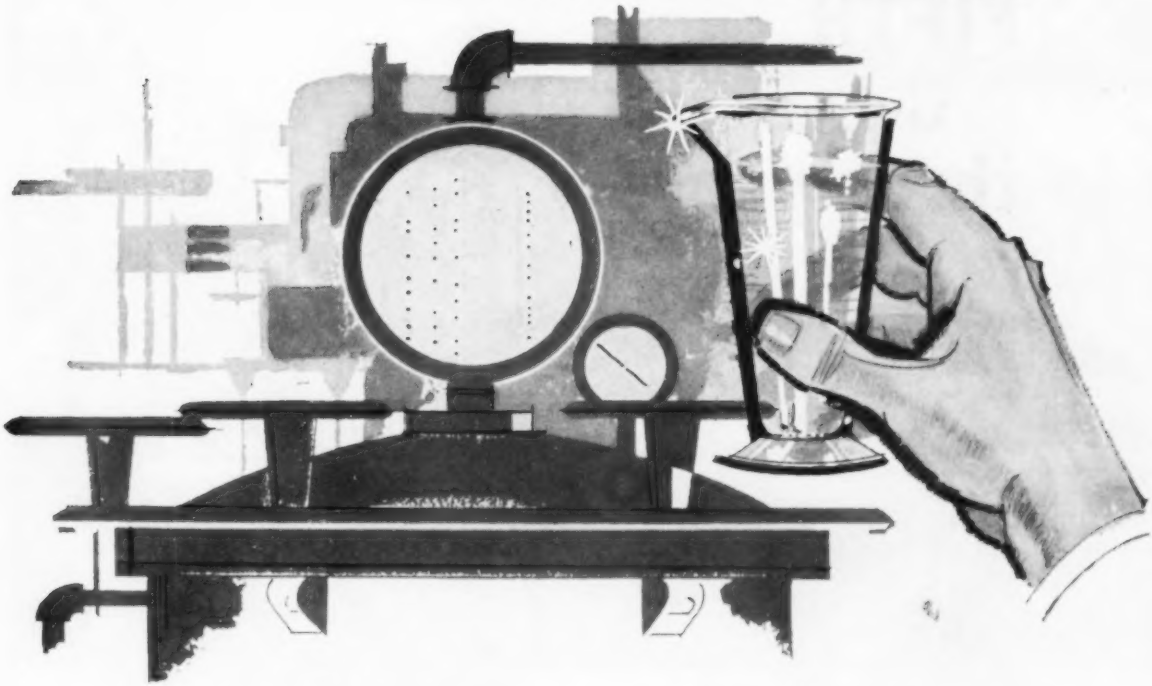

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Eagle-Picher's vast Nevada operations have made newly available *several million tons* of extremely high quality filter aid diatomite.

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A complete range of grades of filter aids are produced by Eagle-Picher in the world's newest, most efficient diatomite processing plant.

With this remarkable "on-grade" uniformity, you get precise control of clarity, at controlled flow rates.

Non-organic, Eagle-Picher filter aids are sterilized . . . are chemically and physically inert. Cannot alter or impart flavor.

You get "sharp" filtration that removes all thermophiles and unwanted solids in the colloidal and submicroscopic range.

The unmatched purity of Eagle-Picher Filter Aids results in a lower wet density, providing greater surface coverage. Users report substantial production economies.

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☐ Please submit sample_____ (size needed)
Type Product to be filtered

Filter-Aid to be used for:
☐ Primary filtering ☐ Pre-coat
☐ High clarity or polishing ☐ Admixture

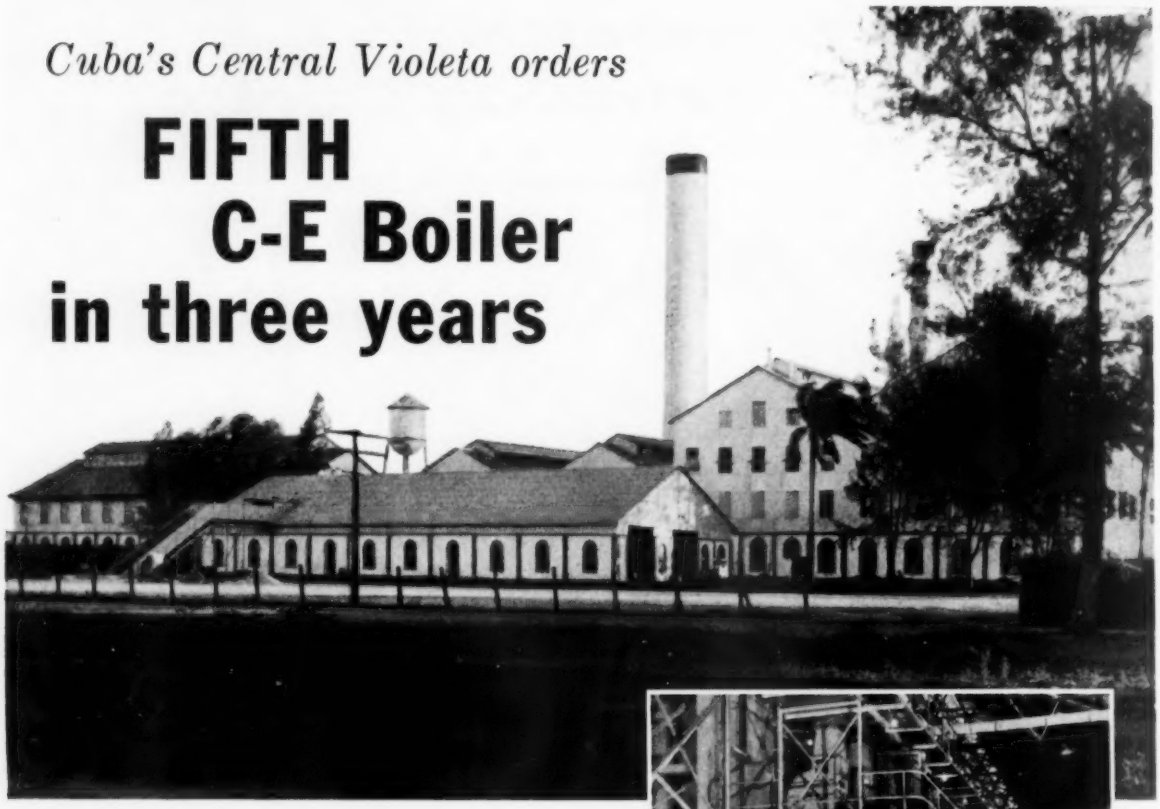
NAME_____ TITLE_____

COMPANY_____

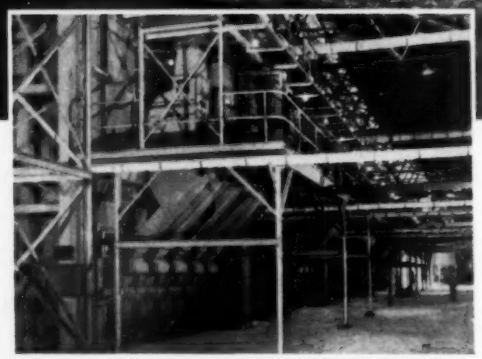
STREET_____ CITY_____ STATE_____

Cuba's Central Violeta orders

FIFTH C-E Boiler in three years



Bagasse-fired Combustion units generate half-a-million pounds of steam per hour for this modern sugar mill



Firing aisle showing Combustion Bagasse-burning units in service at Central Violeta.

The emphasis on modern mill practice that characterizes Central Violeta shows clearly in its approach to bagasse-burning. In 1955, four C-E Boilers and Bagasse-burning Stokers were ordered for this plant. The economic advantages of producing steam and power with this advanced equipment were quickly recognized, and no time was lost in exploiting these benefits further. A 1958 re-order expanded the Central's bagasse-produced steam capacity to 500,000 pounds per hour.

Within the past ten years, 37 C-E Boilers have been purchased by Cuban mills. These are capable of generating over 2,000,000 pounds of steam per hour. Twenty-two are equipped with C-E Bagasse-burning Stokers, and 7 additional Stokers have been purchased separately for application to existing boilers or those of other make.

Repeat orders are typical of the response that C-E Bagasse-burning equipment has received throughout the sugar-producing world. If *you* are interested in any fuel burning or steam generating application — in conjunction with any process in the sugar industry — call on the company with broadest experience in your field. The Combustion representatives in your area will be glad to work with you or your consultants. For specific information, contact the Combustion representative nearest you, or write directly to our Export Department in New York.

Associates, licensees and representatives throughout the free world

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ALL TYPES OF STEAM GENERATING, FUEL BURNING AND RELATED EQUIPMENT; NUCLEAR REACTORS; PAPER MILL EQUIPMENT; PULVERIZERS; FLASH DRYING SYSTEMS; PRESSURE VESSELS; SOIL PIPE

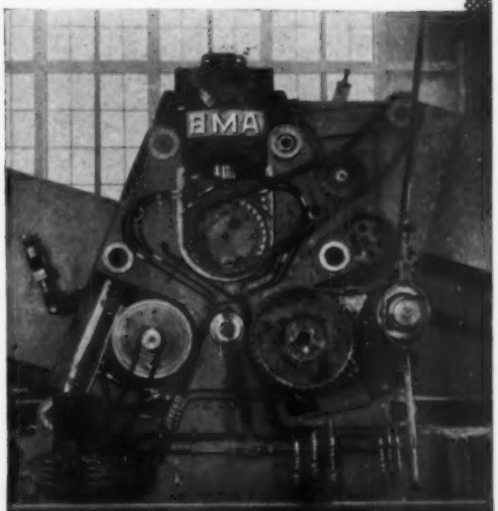
BMA

Sugar cane mills

are of modern and sturdy contsruction and have proved to be most satisfactory in the sugar cane industry.

Specialties of the BMA-plan bearing mill:

- The new hinged triangular frames permit a high top roller load
- Quicker change of rollers by lifting the hydraulic head or the side flaps
- Very tightly closed bearings which ensure perfect operation
- Central lubrication for each mill



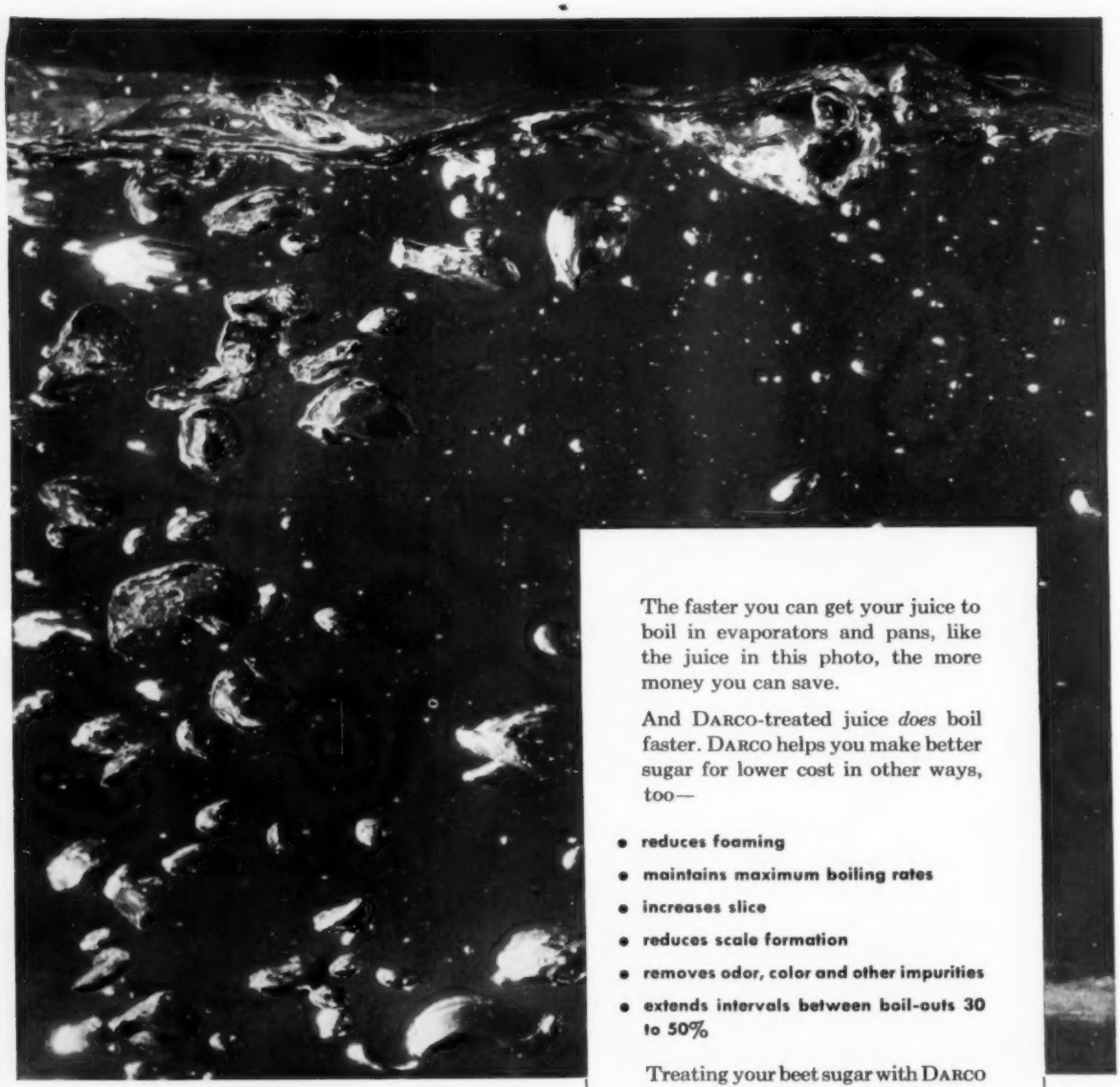
The roller bearing mill with 3-spindle drive designed by the BMA has also been successful due to the simple servicing methods.
These modern milling plants have been supplied by us to Middle- and South America as well as to South-Asia. During the course of the last three years we erected 8 complete cane sugar factories in India.

BRAUNSCHWEIGISCHE MASCHINENBAUANSTALT

BRAUNSCHWEIG · WESTERN GERMANY

Since more than 100 years complete factories for

Beet sugar and cane sugar as well as plants for alcohol · yeast · starch · tannings substances and vegetable oils



DARCO®-treated beet juice boils faster

The faster you can get your juice to boil in evaporators and pans, like the juice in this photo, the more money you can save.

And DARCO-treated juice *does* boil faster. DARCO helps you make better sugar for lower cost in other ways, too—

- **reduces foaming**
- **maintains maximum boiling rates**
- **increases slice**
- **reduces scale formation**
- **removes odor, color and other impurities**
- **extends intervals between boil-outs 30 to 50%**

Treating your beet sugar with DARCO activated carbon can improve both the quality of your beet sugar and your production economy. Let us show you how this low-cost process can be applied in your plant. Write or call us today.

DARCO

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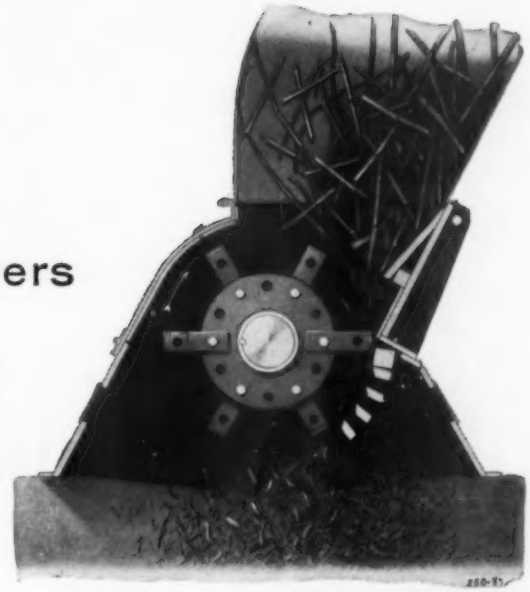
Save time and increase yields with **JEFFREY** Shredders

Jeffrey shredders break down juice-bearing cane cells, so you get more complete sucrose extraction in your mills. Milling efficiency is increased—plant capacity expanded. Shredders are built for large or moderate capacities.



Frames of Jeffrey shredders are designed to avoid objectionable buildup of damp sticky cane.

Move a few pounds per hour or tons with **JEFFREY** MV Conveyors

Double section open pan MV Conveyor

Used where other types of conveyors are not adaptable, only partially suitable or too expensive to maintain, Jeffrey MV (Mechanical Vibrating) Conveyors move materials *fast*. They are simple in design, dependable in operation, rugged in construction.

High speed up-and-forward motion of the conveyor deck picks up and moves material forward; the deck falls away from the material on the backward stroke, so there's no sliding action to cause wear. Jeffrey MV Conveyors are economical to operate and low on upkeep. The Jeffrey Manufacturing Company, 916 North Fourth St., Columbus 16, Ohio.

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JEFFREY

Bethlehem doesn't limit its production of steel to a few general items. It is a world supplier of steel in all standard forms, including bars, alloy steels, tool steels, plates, structural shapes, sheets, strip, tin plate, wire products, rods, pipe, rails.

Bethlehem is a completely integrated steelmaking organization. We have our own ore mines, furnaces, treating ovens, rolling mills, laboratories, and all other equipment needed in the making of steel. Centralized control enables us to fill your wants more promptly and to furnish you with a wide variety of steel products in virtually every form.

No matter where you are, you're always close to a Bethlehem office or representative. It is the job of our offices and representatives everywhere to keep you supplied with the products we make, and to give you friendly service at all times. Bethlehem Steel Export Corporation, 25 Broadway, New York 4, U.S.A. Cables: "BETHLEHEM, NEWYORK."

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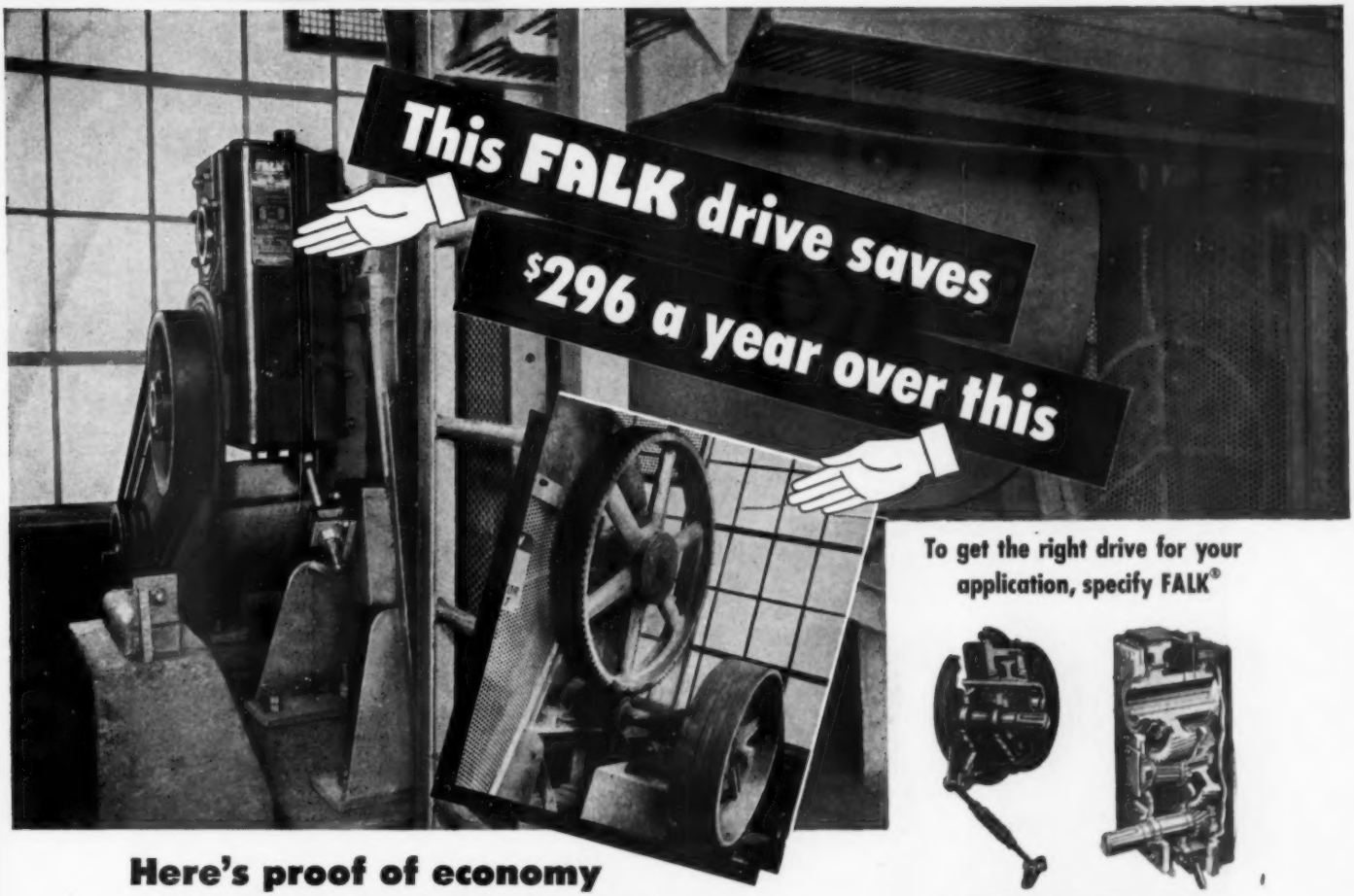

Here's proof of economy with FALK Shaft Mounted Drives

PROBLEM—For many years, a prominent Eastern abrasives manufacturer* experienced high maintenance and down-time costs, as well as excessive noise and vibration, in the operation of 19 pebble mills driven by open spur gears. Drive gears and jack shaft pillow blocks required frequent repairs or replacement, and trunnion shafts often failed, due to radial overloading of the bull gear when broken pinion teeth bottomed between gear teeth.

SOLUTION—After numerous unsuccessful approaches to these problems, the solution was found by mounting a Size 315J FALK Shaft Mounted Drive directly on the mill drive trunnion. This eliminated objectionable gear noise and vibration...greatly reduced costly down-time and loss of production...and cut annual maintenance and replacement expenses as indicated by the following figures taken from the customer's records:

Spur Gear-and-Pinion Drive		FALK Shaft Mounted Drive	
Bull Gears	$ 56	VEE Belts	$ 30
Pinions	120	FALK Shaft Mounted Drive (based on 10-year life)	70
Pillow Blocks	90		
VEE Belts	30		
Trunnion (5-year life)	100		
Annual cost	$396	Annual cost	$100
		ANNUAL SAVINGS	$296

IF OBSOLETE DRIVES ARE COSTING YOU MONEY, a change to Falk All-Steel Shaft Mounted Drives can effect important savings in money and production. Used on almost any type of machine, these compact, rugged units are establishing new standards of economy and efficiency in many industries. Specify FALK Drives on your purchased equipment...For full details, **write for Bulletin 7100.**

*Name on request

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SHAFT MOUNTED DRIVES

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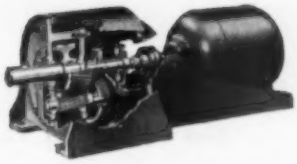

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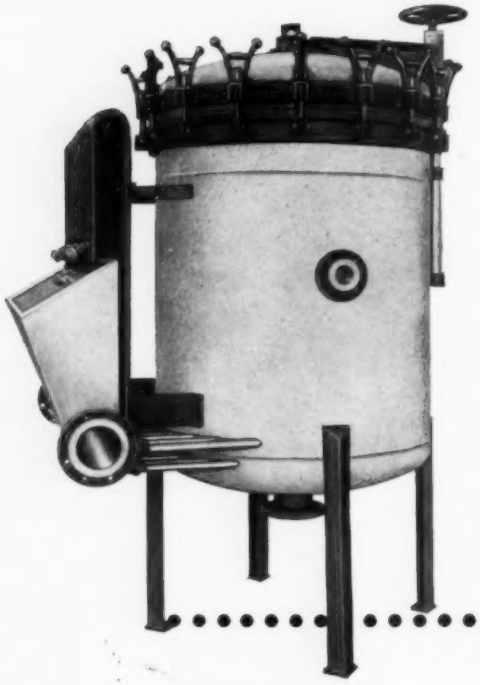

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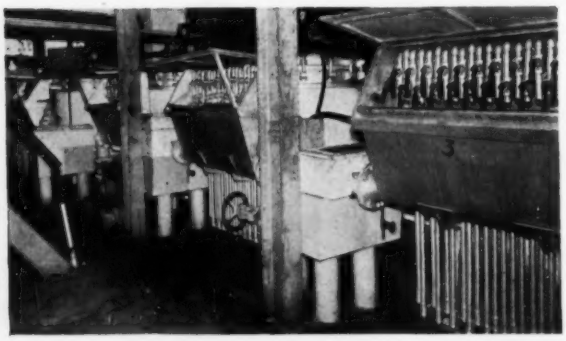

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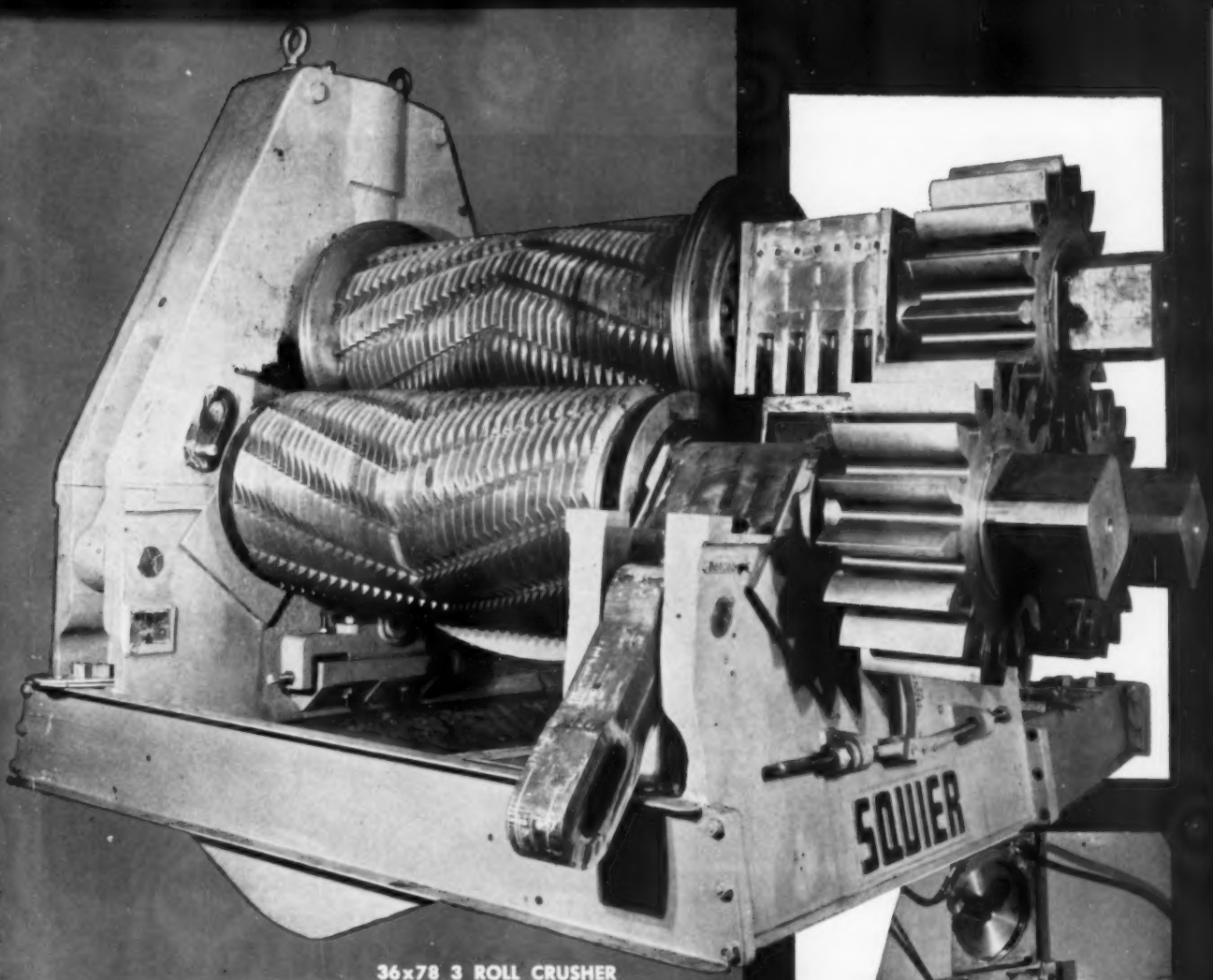

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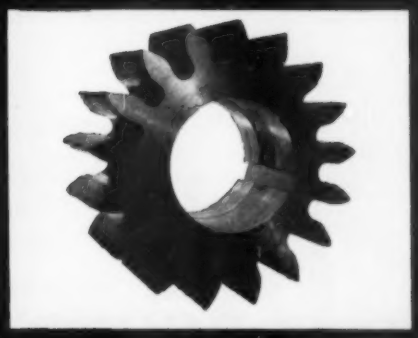

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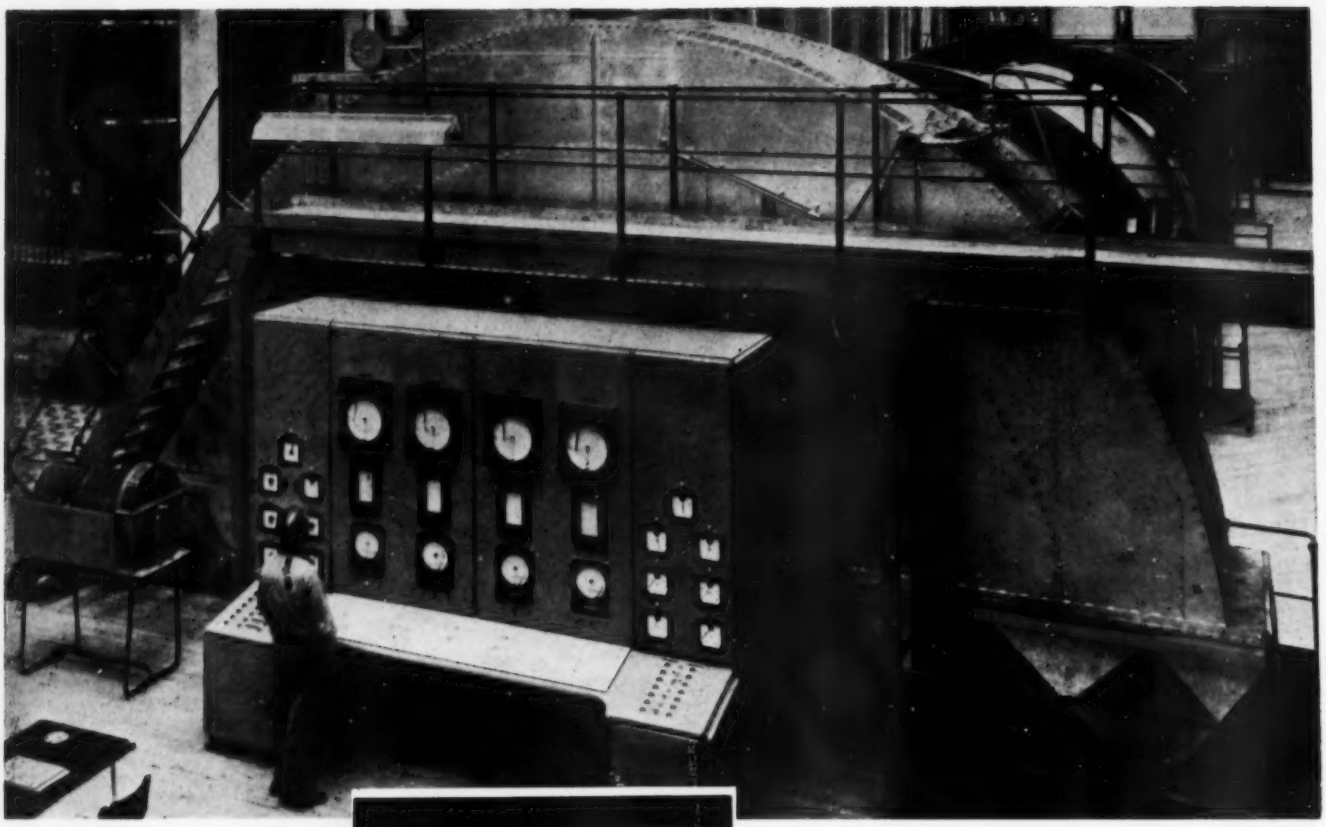

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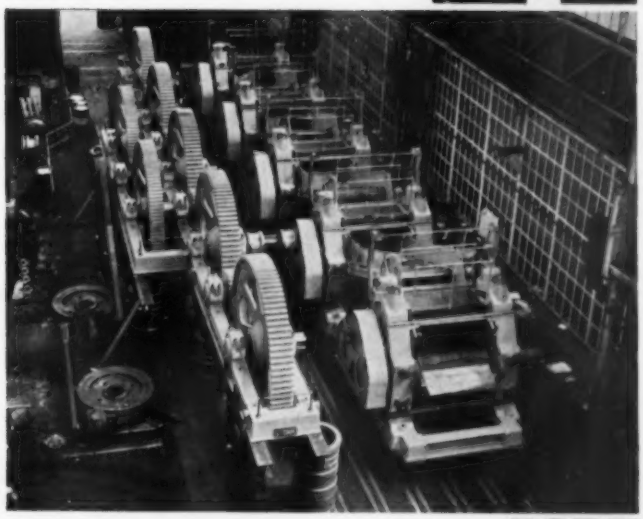

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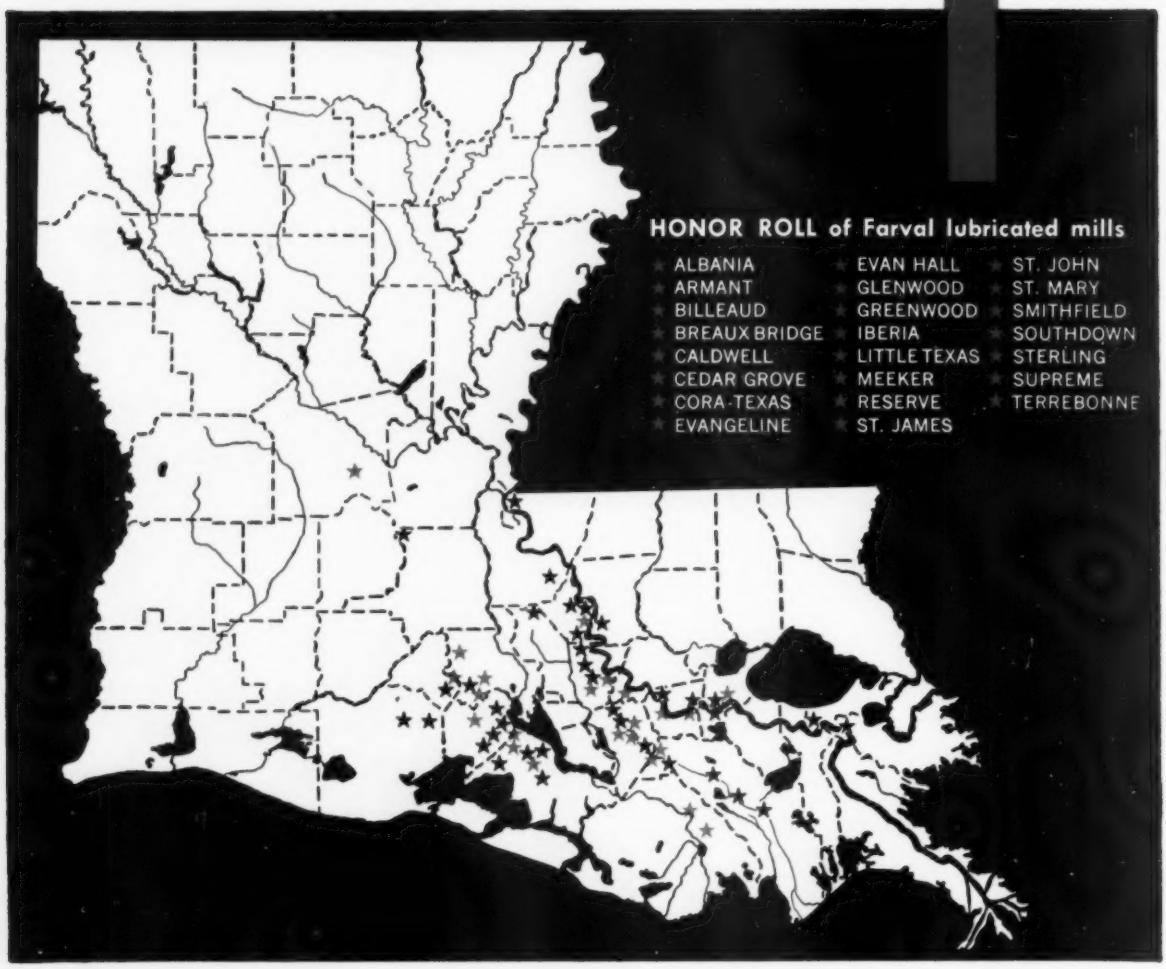
Farval lubricates 23 of its 50 sugar mills

FARVAL— *Studies in Centralized Lubrication* **No. 208**



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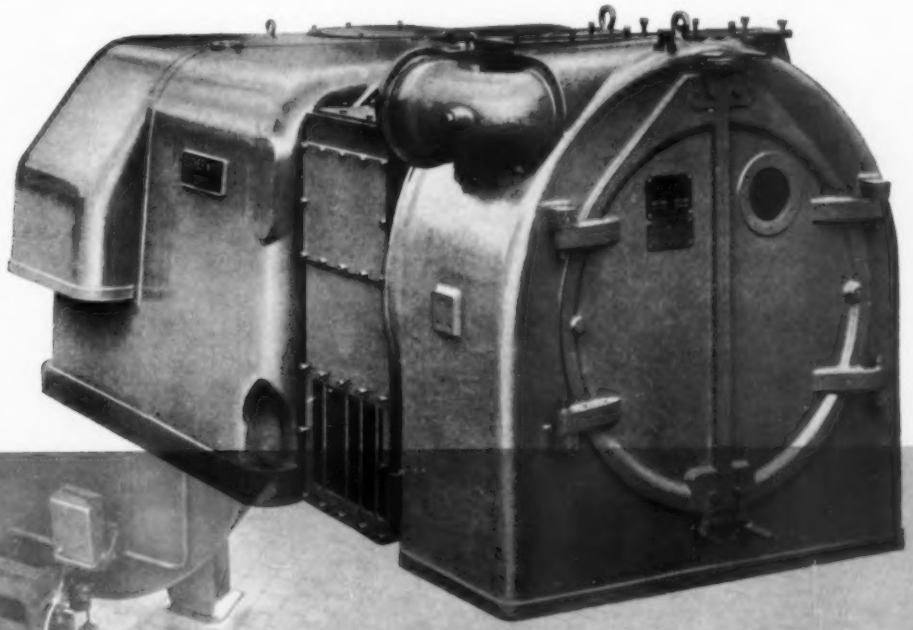
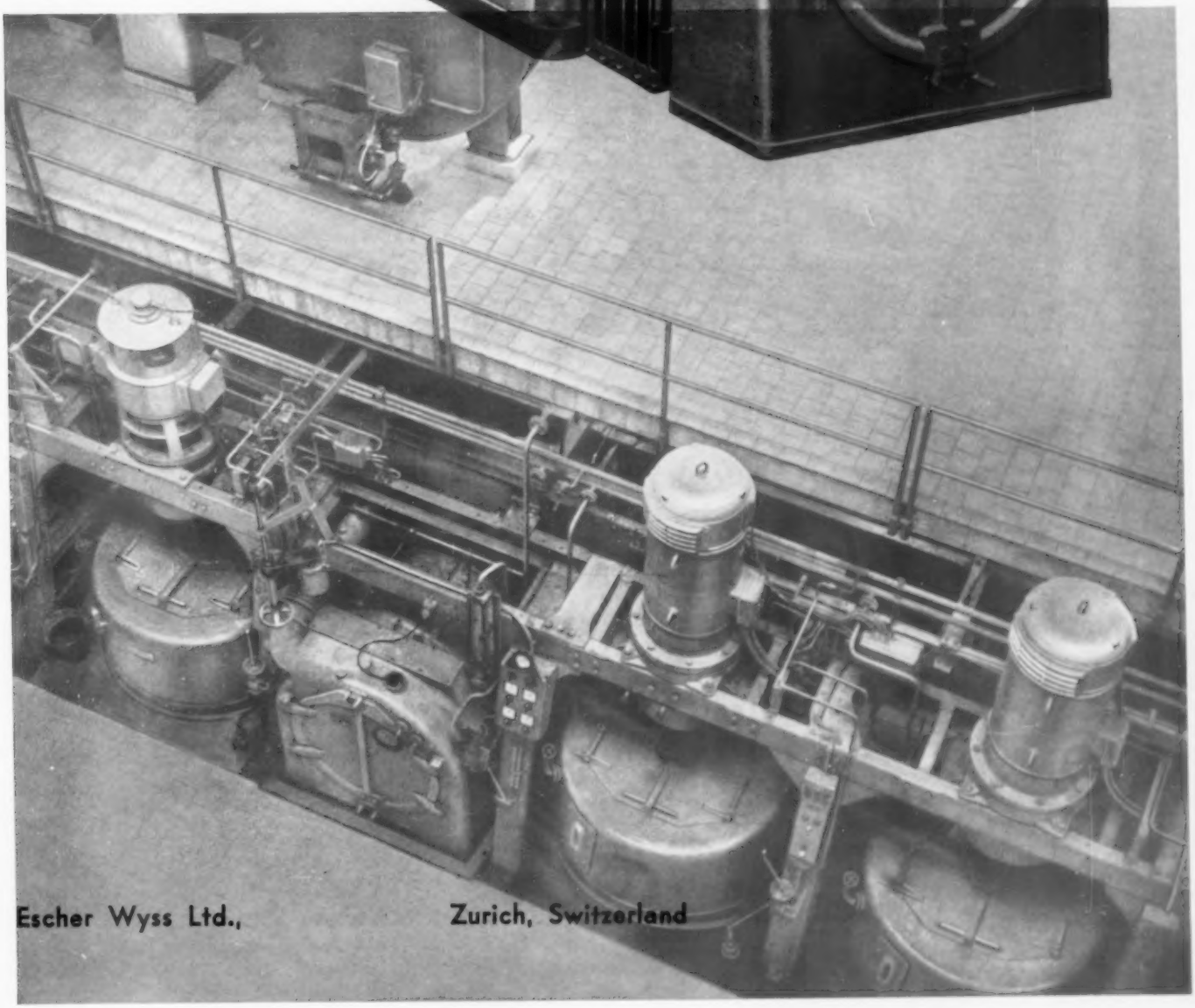
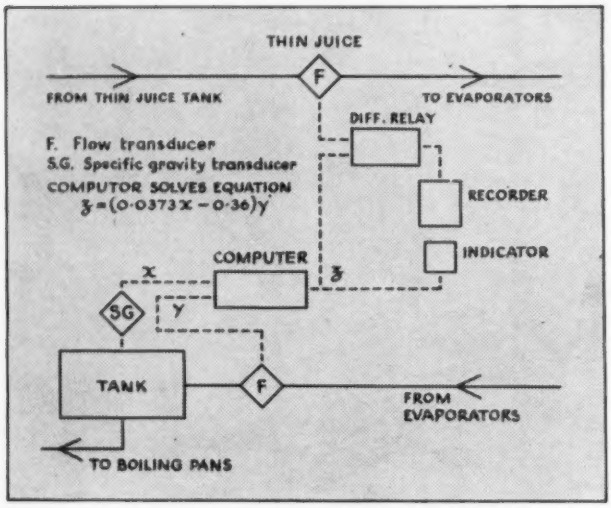


Escher Wyss Centrifuge as replacement in a battery of vertical machines.



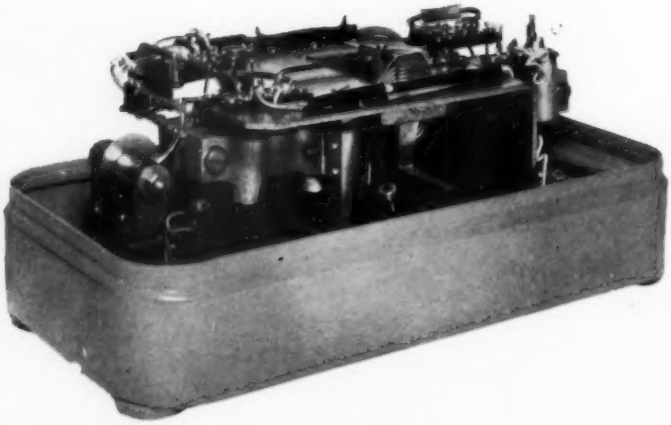
Escher Wyss Ltd., Zurich, Switzerland

Simple check method on sugar losses in Evaporators gives greater plant efficiency



From input signals representing the thick juice flow rate and Brix degree THE EVERSHED SIMPLE ANALOGUE COMPUTER supplies a current corresponding to mass flow rate of raw sugar leaving the evaporators. The computer output indicated on the control panel is also used to supply the input signal to the differential relay as shown.

By the use of this simple method of calculation, sugar losses in the evaporators are kept under constant observation, thus leading to greater operating efficiency.



The Evershed Simple Computer is an analogue device operating on D.C. input signals (up to 6 inputs) and supplying an output current algebraically related to the signals.

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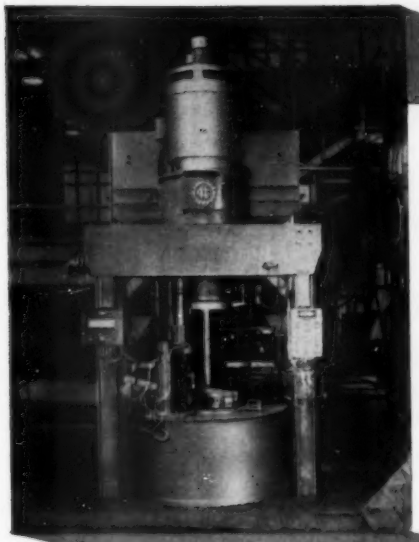

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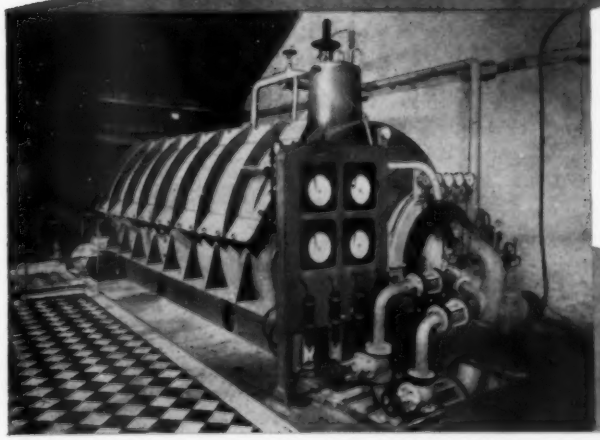

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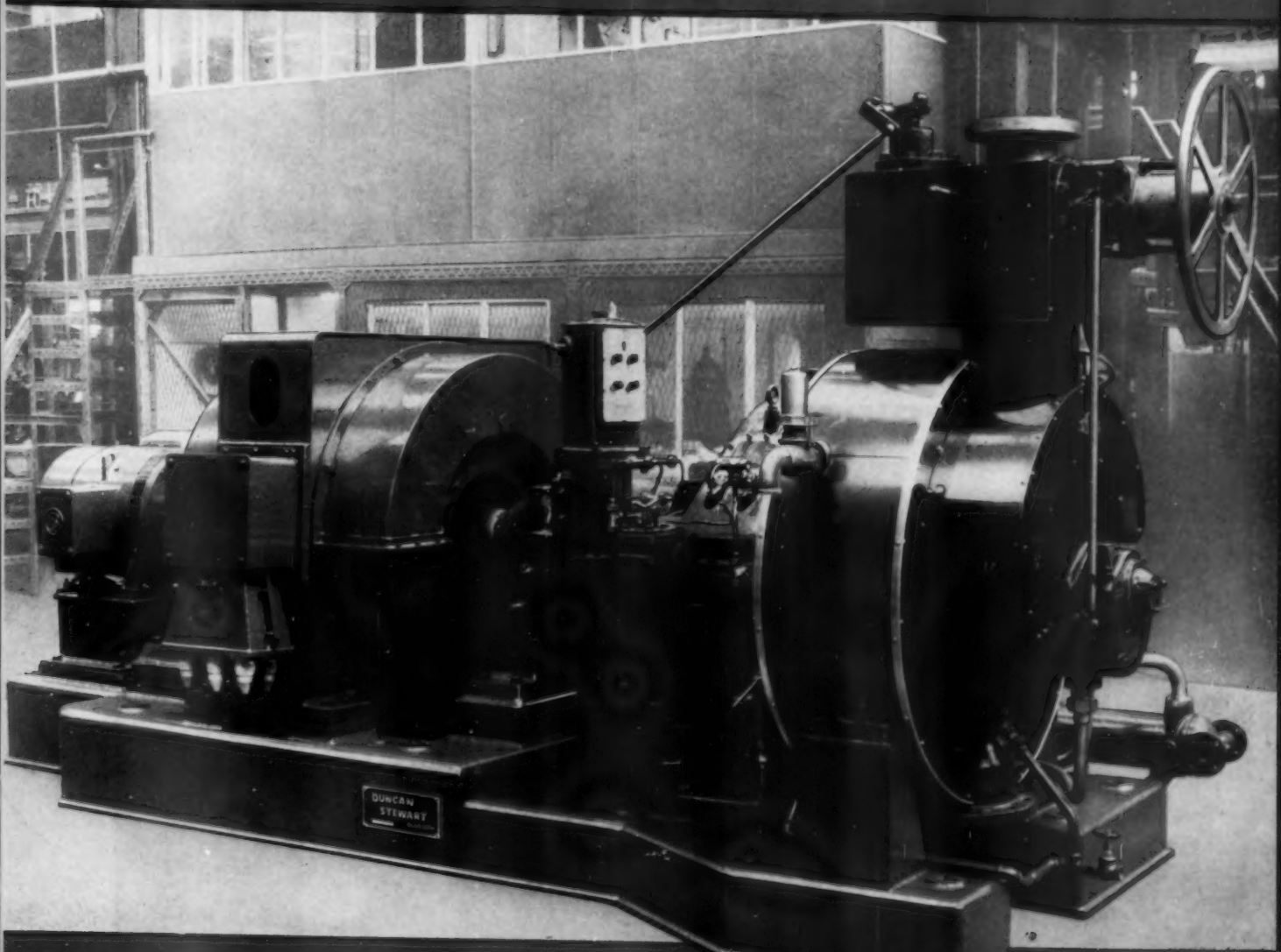

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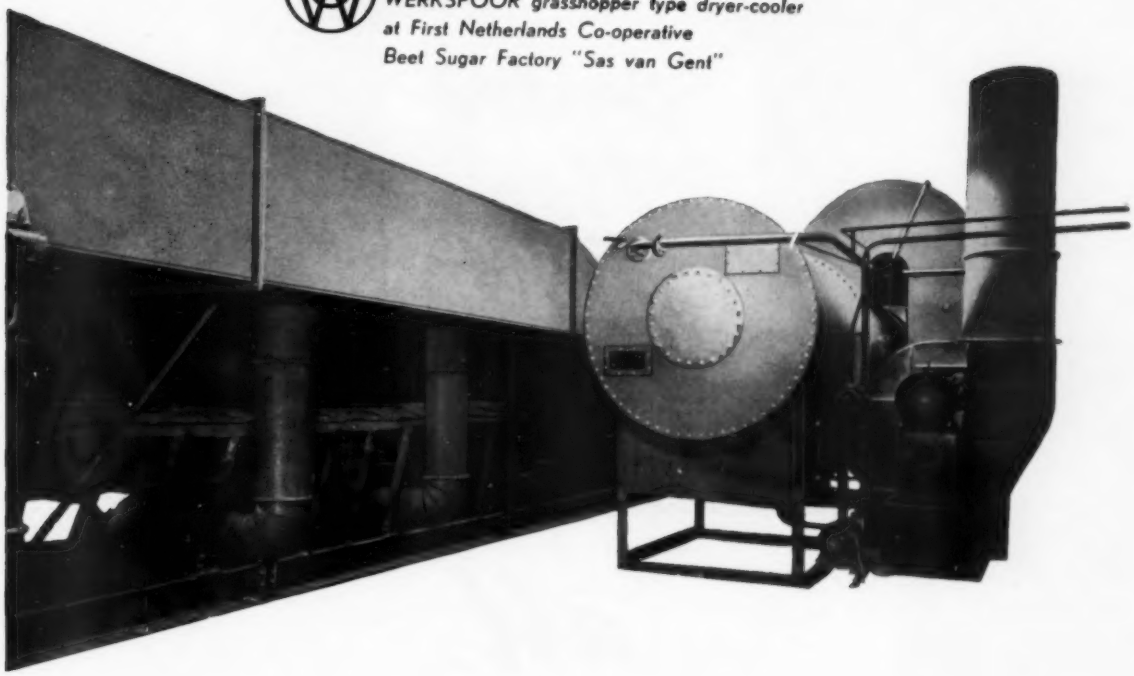

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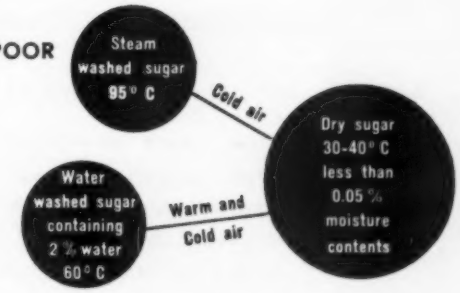

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Correlation Studies in Georgia

SUGAR

SEPTEMBER, 1959

Precipitation — Temperature Effect on Cane Yields

E. S. Lyons

Formerly Research Agronomist, Crops Research Division, Agricultural Research Service, U. S. Department of Agriculture, Cairo, Georgia

While the effects of weather, especially rainfall and temperatures, on growth of crop plants are well known and referred to in many popular articles, reports, and scientific writings, few data are available on the correlation of weather and yields of crop plants.

The effects of seasonal rainfall and temperatures on yields of sugarcane have often been an important consideration in interpreting data from agronomic experiments at the U. S. Sugar Crops Field Station, Cairo, Ga. Yield data for a single variety, C.P. 29-116, and rainfall and temperature records for a 20-year period made it possible to undertake a correlation study of these weather factors with yields. The information furnished herein might be valuable in predicting sugarcane yields prior to harvest, and would have some application in cane growing areas where conditions are similar to Southwest Georgia.

Correlations were determined for acre yields of sugarcane with rainfall and/or temperature by months from January to October. The crop is usually harvested in November. Data for the simple correlations and the r required for significance at the 5% and 1% levels are given in Table 1.

TABLE 1

Correlations of precipitation and temperature with acre yields of C.P. 29-116 at Cairo, Ga., for the 20-year period 1937-1956

Period	r values for — Yield and precipitation	Yield and temperature
January-October	.392	.272
March-October	.376	.205
January	.152	.058
February	.161	.258
March	.007	.547*
April	.627**	.160
May	—.244	.323
June	—.161	.036
July	.129	—.244
August	.205	—.447*
September	.423	—.014
October	.072	—.292

r required for significance: .05 = .444, and .01 = .561.
*Significant at 5% level.
**Significant at 1% level.

April was the only month which showed a significant correlation of sugarcane yields with precipitation. Correlations for the other months are low except for September, for which the correlation is slightly below that required for significance at the one percent level. When the total rainfall for the period January to October or March to October was used, the correlation value was slightly below the five percent level.

There were two months for which the correlations of yield with temperature was significant. For March the correlation was positive and slightly below the one percent level of significance, while for August the correlation was negative and only slightly above the five percent level.

Partial correlations were calculated for the data for April and for September (Table 2). Where precipitation and yield data were used, eliminating temperature, the partial coefficient for April was .614 and for September .431 (r required for significance at the five percent level was 0.545, and at the one percent level, 0.647). The partial correlation for either month differed only slightly from the simple correlation of precipitation and yield. This would indicate that little, if any, of the correlation found for precipitation and yields was due to a temperature effect when both were for the same month.

The partial correlation of temperature and yield, eliminating the effect of precipitation, was .236 for April and .228 for September. Neither of these reaches the five percent level of significance, but both are slightly higher than the simple correlation for temperature and yield. These data indicate that the effect of precipitation is small when eliminated in a partial correlation of temperatures and yields of sugarcane, and also that temperature and/or precipitation have little mutual effect when considered for the same month.

TABLE 2

Partial correlations of yield of C.P. 29-116 sugarcane with precipitation and/or temperature for April and September at the U. S. Sugar Crops Field Station, Cairo, Ga., during the 20-year period 1937-1956

Factors correlated	Partial correlation coefficient
Yield and April precipitation, eliminating April temperature	.614*
Yield and April temperature, eliminating April precipitation	.236
Yield and September precipitation, eliminating September temperature	.431
Yield and September temperature, eliminating September precipitation	.228

r required for significance: .05 = .545, and .01 = .647.
*Significant at 5% level.

Since significant simple correlations were found for April precipitation with yield and for March temperatures with yield, what would be the result of a multiple correlation or the combined effect of March temperature and April precipitation on yield? When this multiple correlation (R) was calculated, the R was 0.833; the one percent requirement for significance was only 0.647. This shows that the two factors of March temperature and April precipitation were related in their effect on yield, as the multiple correlation was considerably higher than the simple correlation of either April precipitation or March temperatures with yield.

During the seven years in which the April precipitation and March temperatures were above average, the mean yield of cane per acre was 3.33 tons above the 20-year mean. There were five years in which both the April precipitation and the

(*Continued on page* 38)

Figure 1

Economics of Preventive Weed Control

Pre-Emergence Herbicides Reduce Labor Costs

Jack R. Nail, William R. Irey and Eduardo W. Zomosa

E. I. du Pont de Nemours & Company

ONE of the basic factors in the economics of the cane sugar industry is the cost of labor required to produce the cane crop, and a principal item in this cost is the expense of keeping the cane fields free of weeds.

There are two principal methods for controlling weeds; one of these is handwork applied by use of the hand hoe and the power-driven cultivator. The other way is to kill the weeds by chemicals applied by spraying or dusting. Any method of weed control for sugar cane must be measured against the cost of removing weeds by hand. Handwork can keep fields virtually free of weeds under almost any growing condition, provided that labor is available and the planter is willing to pay the cost. However, it is rarely practical to achieve this ideal. For one thing, it would be necessary to maintain a prohibitive reserve of labor force to keep fields weedless during rainy seasons or peak labor seasons such as planting or harvest times. And as manpower requirements for other phases of cane production are reduced by mechanization, planters will have less labor available for weeding between planting and close-in.

Figure 2

Typical records on Puerto Rican plantations indicate that handwork for weeding accounted for 15 to 20% of production costs in 1954, requiring five to eight man-days for the first hoeing alone, and 20 to 30 man-days for a seasons hoeing. On plantations where mechanized cultivation and pre-emergence weed control by herbicides have been adopted, the cost of weeding has been reduced to about eight percent of total cost per acre, and now two man-days per acre are enough to take care of all necessary hand weeding. In the Dominican Republic, the practice of treating the soil with 2,4D plus hand weeding requires 10 to 12 days. But it is estimated that with use of pre-emergence herbicides, man power for weeding could be cut below ten man-days, and probably as low as four man-days.

The man power required to control weeds depends on weed growth and degree of control desired. Rainfall and its seasonal distribution are the main factors involved. In the drier areas of Mauritius where rain averages 60 inches three weedings per season are enough for plant cane. This amounts to 12 man-days per acre. Where rain in wetter areas goes up to 136 inches a total of 40 man-days per acre may be necessary. The effect of seasonal distribution of rain can be seen in South Africa. In the Felixton area an annual rainfall of 65 inches is spread over all 12 months; three weedings or 18 man-days per acre required. In Zululand the annual rainfall of 40 inches is concentrated in November-February and five weedings may be necessary, which will require 20 to 30 man-days. In the Port Shepstone area with 40 inches of rain concentrated in September and November, three to five weedings, equal to 16 to 20 man-days are needed.

Here is where the use of pre-emergence herbicides, applied to the planted field before the weeds germinate, shows up to advantage. In prolonged rainy periods weeding by hand is impracticable, while the weeds grow in profusion.

Largely to meet these variations of moisture conditions, E. I. duPont de Nemours & Company have developed two chemical herbicides known as "Telvar," and "Karmex." Both are substituted ureas. The main difference is in their solubilities in water, but both are 80% wettable. Karmex is only about one-sixth as soluble as Telvar, which means that it is slow-leaching, and gives longer weed control in high rainfall areas, while Telvar will be more acceptable where lower solubility is of advantage. These products of du Pont research afford sugarcane growers the great efficiency of preventive weed control, but they are not intended for control of severe infestations of established species. They are effective as residual preventive materials to keep grasses and broadleafed weeds from sprouting in the first place, and they

Figure 3

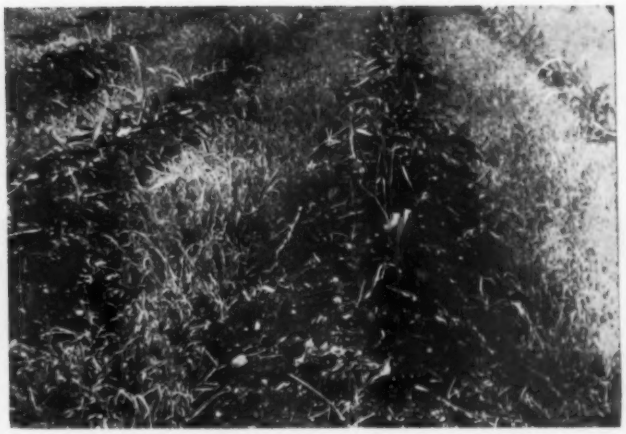


Figure 4

suppress weed propagation until the cane has closed in. Karmex has two advantages over Telvar, a greater margin of safety for most crops and longer residual control in light soils and in areas of high rainfall.

The difference between the cost of the chemical program and the labor it replaces measures the economic value of the chemical program to the sugar cane grower. Hand spraying with one of these chemicals may require one to six man-hours per acre, plus the cost of the chemical. In Hawaii, one man with a three-nozzle boom on a knapsack sprayer is expected to cover five to eight acres of cane in an eight-hour day. Tractor-drawn sprayers can cover 20 to 50 acres per day, depending on terrain, stage of the crop and soil moisture. Airplane spraying is estimated to cost about two and one-half times as much as hand spraying in Puerto Rico. But since it is done on a custom basis, there is no capital investment or overhead operating cost. Furthermore, airplane spraying can often be done on a more timely and uniform basis.

In considering the adoption of pre-emergence weed control, trends in labor supply and wage standards, economic diversification of the area, and other technological trends in sugar production should all be taken into account. Labor shortages, rising wage levels, development of new employment opportunities for field labor, and adoption of mechanized planting and harvesting may all speed the need for low-labor weed control.

In some areas, pre-emergence weed control with "Telvar" monuron weed killer and "Karmex" diuron weed killer is well on its way to becoming an accepted commercial practice. Elsewhere, forward-looking sugar planters are becoming familiar with the application of this practice, at least on a trial basis. Any new practice in soil management has to be adapted to local conditions of soil and climate. Operators and supervisors have to be trained, and sources of supply have to be developed. Equipment needed for the job must be available at the proper season of the year.

All of these factors must be considered in the early stages of commercial adoption of pre-emergence weed control. In selecting locations for trials, it is well to choose fields with a history of high costs of weeding seed-propagated weeds. Advantages of the chemical program will be more evident in wet seasons than in dry seasons. "Telvar" and "Karmex" show up to best advantage in both economics and performance when used at the wettest season of the year, in fields with a history of high-cost weed control; where the greatest problem is weed species growing from seed, especially grasses, at a time of year when labor supply is most acute.

These herbicides are to be mixed with water and applied to the soil surface as a pre-emergent spray, before any weeds emerge. The land is prepared as usual by plowing and harrowing; furrows are opened, the cane is planted and covered, and a roller is used to press down the soil

(*Continued on page* 40)

Figure 5

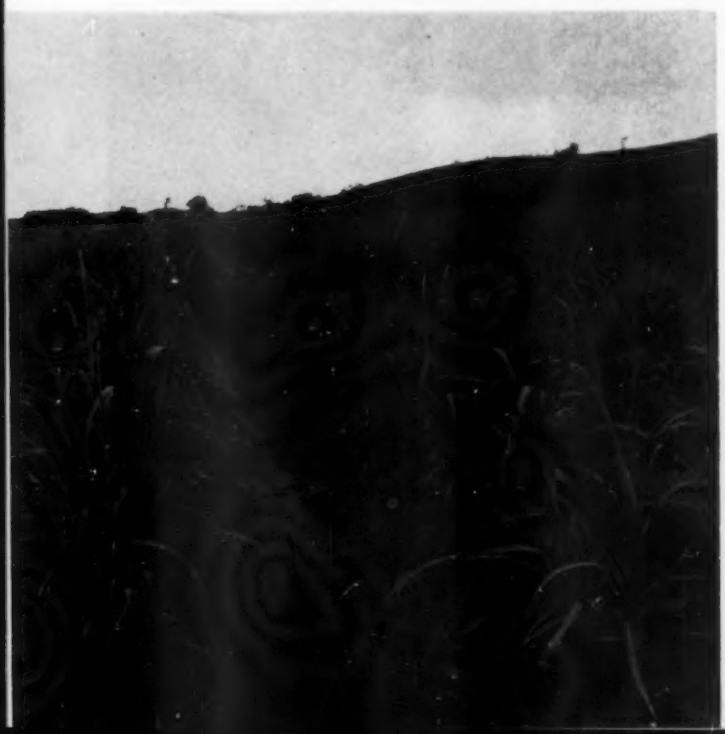
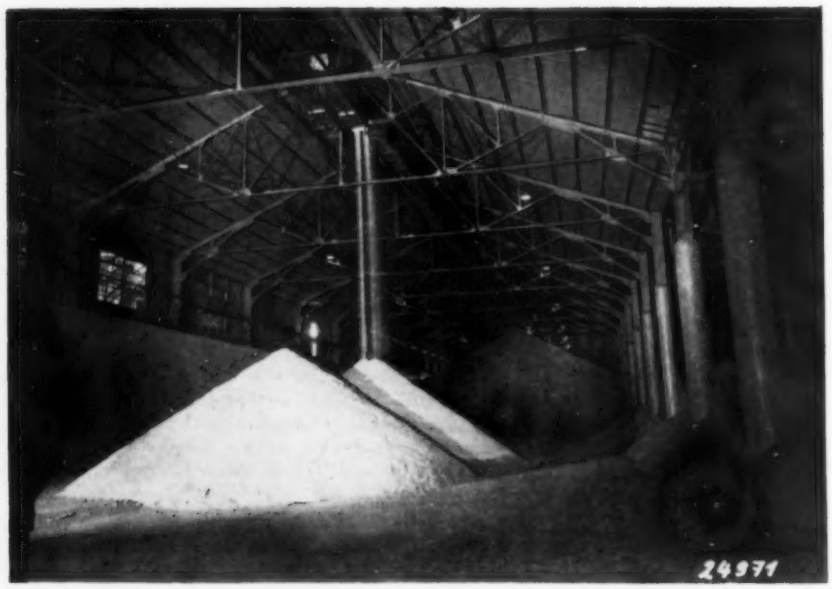


Figure 6

Bulk Handling in Dominican Republic

New Rio Haina Facility in Operation



Inside one of the four warehouses a continuous stream of raw sugar drops from the Buhler chain conveyor supported by the roof beams.

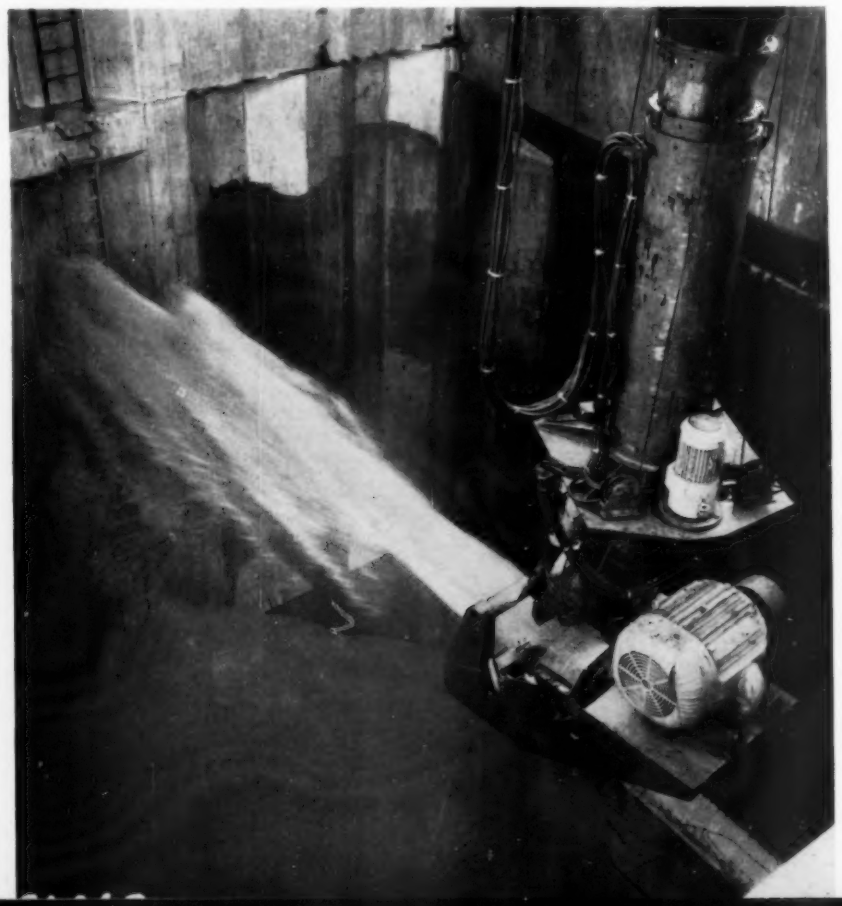
CENTRAL Rio Haina in the Dominican Republic, one of the world's largest raw sugar mills producing approximately 200,000 tons annually, has been operating a bulk shipping installation, since the beginning of 1959. Extensive modernization work has been underway at the mill for several years. Recently the installation of a battery of automatic centrifugals cleared the way for the construction of an elaborate, high capacity bulk raw storage and ship loading facility. The equipment was designed and installed by Buhler Brothers of Switzerland working with engineers of Azucarera Haina, C. por A. In addition to Central Rio Haina, the parent company owns and operates several other mills in the Dominican Republic which accounts for one of the unique features of the bulk handling system.

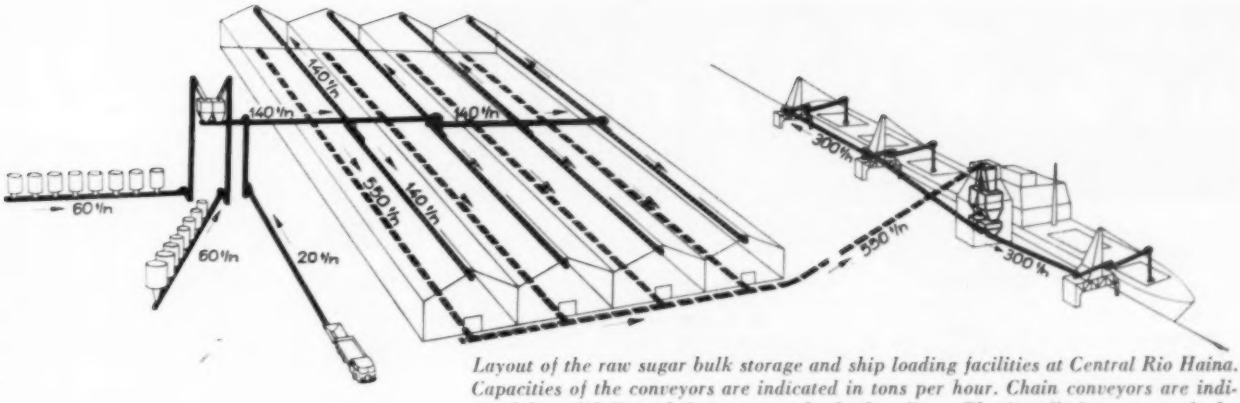
Referring to the accompanying diagram, two Buhler chain conveyors bring the sugar from each row of centrifuges to two vertical bucket elevators with a capacity of 60 tons/hour. Next, the sugar from each production line is automatically weighed. Two conveyors in series under the roofs of the warehouse distribute the raw sugar within the building. Each warehouse has a length of 130 m. The sugar is distributed inside each warehouse by means of one conveyor running from the center to the left and another from the center to the right, both supported by the existing roof structure.

In order to allow other, smaller mills belonging to the same company to use the modern ship loading equipment, a separate truck dump was installed which allows producers to deliver their sugar to the new conveying system. A truck scale takes care of the weighing.

For reclaiming raw sugar from each of the four warehouses, which have a total capacity of 87,000 tons, a belt conveyor was installed in the center of the floor of each warehouse. The belts are covered with removable aluminium profiles. By removing one of these covers, the raw sugar will flow automatically onto the belt. The remaining sugar is fed to these belt conveyors by means of payloaders. A specially constructed movable chain conveyor device prevents overloading of the draw-off belts and guarantees a constant peak capacity of 550 tons/hour. A further belt conveyor,

The trimmer located at the end of the telescopic chute sprays the sugar inside the ship's hold at the rate of 300 tons/hour.





Layout of the raw sugar bulk storage and ship loading facilities at Central Rio Haina. Capacities of the conveyors are indicated in tons per hour. Chain conveyors are indicated by solid lines, belt conveyors by broken lines. The installation was made by Buhler Brothers. Capacity of the four warehouses is 87,000 tons

Bulk sugar ship "Crystal Jewel" loading 10,000 tons of raw sugar in 20 hours at Rio Haina.

installed at right angle outside the warehouses delivers the raw sugar to the weighing tower on the shipping pier. Within this tower two raw sugar tipping scales of special construction guarantee an accuracy of one percent. From the weighing tower the raw sugar is distributed in two parallel streams to the three stationary ship loading units. These are engineered in such a way that two of them alone are able to transfer the whole capacity of 550 tons/hour to the ship hatches. The correct spacing of these loading towers called for special studies as it was necessary to load many various types of ships without having to move the latter. The moving arm which reaches over the ship's deck contains another Buhler chain conveyor totally enclosed in order to prevent spillage on the ship's deck. This moving loading arm turns in an arc of 180° and can be lowered or raised. At the outlet of this ship loading conveyor a vertical telescopic chute brings the sugar to a ship trimmer which is attached to the lower end of the telescopic chute. Each ship trimmer can handle 300 tons/hour and throw the raw sugar up to distances of 30 m. It is thus possible to load all corners of every ship's hatch. The whole loading operation is done by remote control from a panel board installed in each loading tower. The operation can also be checked from a centrally located panel board at the weighing tower. Intercom systems provide communications between the various operating centers.

This installation has operated satisfactorily since completion, loading 10,000 ton ships in 20 hours as contrasted to the five to eight days required to load the same cargo in bags.

The three loading towers; any two of them can load at the rate of 550 tons/hour. Main control panel is located in the weighing tower at right center.

Sugar's Progress in

HUMAN RELATIONS

Roy J. Leffingwell

Sugar Companies Can Help Educational Institutions, and Employe Relations

Sugar producers around the world are finding it good business to work with educational institutions. They need the end products—educated manpower and a favorable climate for business. Unfortunately, most educational institutions need financial help to do the job expected of them.

Dow Chemical Co. in the United States started a program in 1957 which may hold some interest for the sugar industry as an educational assistance idea. Dow started a plan of matching gifts which were made by their employes to colleges—up to $100 limit. Name of the program is "Dow Matching Grant for Higher Education."

Thinking behind the program is that both individual and corporate giving are necessary to help educational institutions meet the urgent demands being placed upon them. It was felt that the company's offer to match gifts would encourage individual support, and round out a well-established program of aid to education by Dow.

A look at the operation of the plan to date shows that preliminary confidence in the soundness of the project was well justified. It has drawn praise from educators as a "tremendous reconstructive move." It was also a factor in earning for Dow a national citation for exceptional efforts in providing aid to higher education. So far about 210 colleges and universities in 41 states have benefited.

Under the plan any Dow employe may make unrestricted gifts or they may specify the purpose for which their money is to be spent. The company's matching grant is used for the same purpose as that designated by the employe.

Results seem to justify the company idea that the limited ceiling of $100 would encourage giving on the part of those who can afford only small annual contributions. As one janitor who had never gone to high school said, "I can give as much as the president of the company and have it matched."

An analysis of contributions shows that of those who contributed to the plan in the first year, 36% had not given to an institution of higher learning the previous year. More than 90% of those participating indicated that the plan had influenced their giving, at least some degree.

Reactions from both employes and institutions have been enthusiastic to the plan.

General Electric, another major U. S. corporation, comments that education fills a business need, which should be met in a business-like manner. Philanthropy has no place in this concept. "We have no right to give away our capital or mortgage our income for purposes unrelated to the needs of business. We are under compulsion, however to invest our resources, our time and our talents so that we may achieve new knowledge, educate manpower and have a favorable climate."

Most sugar managements probably agree with G. E.'s concept of operation. Therefore, the Dow matching grant plan for higher education may hold interest for some companies.

While some companies may have had unfortunate experiences with wage incentive plans, research shows that such systems do induce employes to work harder.

John D. Dale, president of the George Elliott Company of New York made a study of 2,500 wage incentive plans in the U. S. In 29 different industries covered it was found that incentive programs resulted in an average increase in productivity of 63½%. The average rise in employe earning was found to be 20.6%, and an average saving of 25.91% was made in unit labor costs.

Broken down still further, the averages show that for every 1% increase in wages, productivity increased by 3.1% and unit labor costs were reduced by 1¼%.

Of the plans studied, 77% were installed since 1948, while the remainder dated from during and before World War II. All plans were based on work measurements arrived at by time studies or predetermined time systems, with incentive bonuses being paid for productivity over and above "standard performance."

R. H. Cottrell, vice president of The Amalgamated Sugar Co. addressed the California Beet Sugar Technologists on the subject of "Beet Sugar Economics," earlier this year.

Mr. Cottrell explained that "realization of a profit is the objective of all sugar company activities." He divided the elements determining profit into three categories for his discussion. These were:

1. Volume of production
2. Cost per unit of production
3. Net sales price of marketable products

He then added . . . "I am firmly convinced that the diligence, know-how and spirit of the organization are necessary to realize the full benefits of improved equipment."

Wages of sugar workers in Australia have moved up again. The State Industrial Court of Queensland issued a quarterly basic wage adjustment which became effective prior to the start of the current harvest season. Increases given were three shillings (about U. S. 30¢) a week for males and two shillings, six pence (about 26¢) for females.

Five students are attending college this fall because of scholarships given by Imperial Sugar Co., Sugar Land, Texas. All three 1959 scholarship winners are children of Imperial employes, although this is not a requirement.

W. H. Louviere, Imperial president, commented that, "Education is important in our lives: First, in order to live in our type of democracy; second, to cope with the inevitable changes that take place continually; third, so that we will all appreciate the dignity of work; fourth, to teach us to get along with our neighbors." He points out that the money for the company's scholarship program actually comes from customers who buy Imperial sugar. Teamwork, he said, makes it possible.

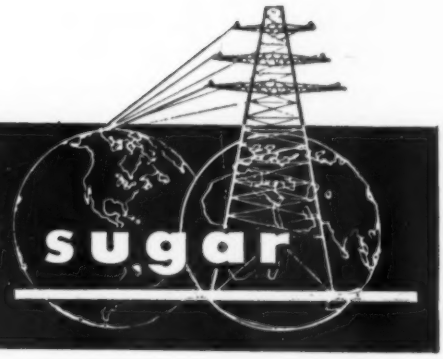
Imperial Sugar Co. has worked eight months without a lost-time accident and were still going strong at last report. This is a new all-time record for the company and an outstanding record in the sugar industry.

Kilauea Sugar Co., located on the Island Kauai, Hawaii, faced up to a long-time public relations problem and has assured local residents that steps will be taken to eliminate water pollution in a nearby bay.

Stanley M. Tutton, Kilauea manager, met with his neighbors and explained that boilers in the factory are in bad condition and cannot utilize all the bagasse produced. Water used in the cane washer also carries a lot of soil out into the ocean, said Mr. Tutton.

"We hope the people will be patient with us until we can make the necessary improvements in our factory facilities," commented the Kilauea manager. New boilers are scheduled to replace the existing ones within the next two years.

facts about sugar



NEW YORK, AUGUST 3: The Executive Committee of the International Sugar Council convened in London on July 30th to exchange views on the world market situation. However, B. W. Dyer & Co., Sugar Economists & Brokers, believe that it will be extremely difficult to solve the surplus problem.

The 1959 Cuban world quota, after the June 23rd reduction, was about 2,285,118 short tons in contrast to Cuban sales (outside U. S.) of 1,480,656 short tons reported by Willet & Gray through July 31st. If previous years can be used as a criterion, it is unlikely that Cuban sales during the balance of 1959 will exceed 500,000 tons. Consequently, the Cuban carryover at the end of 1959 probably will be at least a million tons higher than at the close of last year. Even if part of this is temporarily segregated by some kind of quota legerdemain it will ultimately press on the market.

Following Premier Castro's temporary resignation, Cuban President Uruttia was replaced by Dr. Osvaldo Dorticos, because Uruttia showed opposition to the Cuban Agrarian Reform Law, among other things. The Council of Ministers approved a Tax Reform Law which consolidates all taxes on sugar production into one five per cent levy (which is reported to be at least double the old diversified taxes). Functions of the Cuban Stabilization Institute will be handled in future by a three-man committee composed of Felipe Pazos, President of the National Bank; Regino Boti, Minister of Economy; and, Raul Capero Bonilla, Minister of Commerce.

F. O. Licht at the end of July boosted 1958-59 world production estimates by more than a half million tons to about 55,771,000 short tons. In 1957-58 world production was placed at about 49,815,000 short tons.

World (#4) spot raw sugar prices declined to a new low of 2.55c per pound on July 21st, but advanced to 2.65c by August 3rd on hopes that something constructive might develop at the International Sugar Council meeting.

Domestic (#6) spot prices declined from $5.80 per 100 pounds at the end of June to $5.75 on July 9th, largely as a result of the congestion caused by the shutdown of the Port of Philadelphia on July 6th. The dispute, which followed the longshoremen's refusal to unload sugar on pallets, was settled by arbitration after the port had been closed about 20 days. While the arbiter ruled that it was unsafe in this particular case to discharge refined sugar on pallets, because the ship's gear was faulty, this did not necessarily establish a precedent. Domestic spot prices then advanced sharply to $5.90 on July 22nd, but then declined to $5.80 by the end of that month. However, on August 3rd they advanced to $5.87.

Cane refiners and beet processors announced a refined sugar price advance of $.20 per 100 lbs. in the Chicago-West territory, outside the delivered price zone, to become effective August 7th. After that date the price in that area will be $9.00 for cane and $8.80 for beet. Prior to that announcement, refined sugar prices were increased $.10 in the delivered price area of the Chicago-West territory.

Sugar Prices August 3, 1959

Ex. Duty Raw Sugar N. Y.	**5.87**
Average #6 Raw Sugar Jan. 1 to Aug. 3	**5.62**
Refined Sugar Gross N. Y.	**9.35**
#4 Raw Sugar (f.o.b.) Cuba	**2.65**
Average #4 Sugar Jan. 1 to Aug. 3	**2.95**

Futures Prices	***Contract #6***	***Contract #4***
September 1959	**5.90**	**2.67**
October 1959	**—**	**2.72**
November 1959	**5.90**	**—**
March 1960	**5.49**	**2.82**

The Cuban direct-consumption quota was completely exhausted on July 17th, which was the earliest date that such certifications have ceased in the post-war period. The U. S. Department of Agriculture had announced on July 14th that certifications would be required on July 17th, because 80% of the Cuban "d.c." quota had been filled, and there was a rush to obtain certification.

Hawaii probably will have a U. S. quota deficit of at least 100,000 short tons this year, according to revised estimates. The Puerto Rican deficit should be about 200,000 tons, and the Virgin Islands will have a deficit of a few thousand tons. Thus, the total U. S. quota deficit should be at least 300,000 tons. Slightly over one-quarter of this will be reallocated to Cuba, and the balance to the Domestic beet and Mainland cane areas. Ample supplies exist or are expected in these areas, enabling fulfillment of the deficit reallocations, B. W. Dyer & Co. concludes.

Chloratic Streak Disease In Puerto Rico

Technologists of the Experiment Station of the University of Puerto Rico have succeeded in transmitting the chloratic streak disease of the sugar cane under controlled conditions. The experiments were conducted by Drs. Julio Bird, H. R. Gibbs and M. A. Tio, using two methods. In one method the diseased and the healthy plants were grown together in a nutrient solution contained in the same pot; in the other method they were grown in separate pots through which the solution was circulated by means of pumps. The results show that for transmitting the disease it is not necessary for the roots to be in direct contact; the organism that causes the disease is carried in the soil solution. This seems to explain why the disease is less prevalent in the dryer than in the wetter sections of the Islands.

From New York notice has been received of the death of Don Guillermo Cabrera, a veteran leader in the industry, member of the committee of the P. R. Sugar Producers Association in Washington. For many years he was intimately connected with the Centrales Coloso and Aguirre Sugar Company and served with distinction on the boards of directors. He was buried July 27th at Coral Gables, Miami, Florida.

The value of the sugar cane produced from the irrigation project in the Valle de Lajas has increased from $2,398,036 at the beginning of the project in 1955 to $2,725,071 after irrigation was started. The increased production is partly due to increase of the acreage in cane, and partly to higher yields due to irrigation. The area now under irrigation is about 12,000 acres; the project will eventually be extended to include a total of 25,000 acres most of which will be planted in cane.

Under decision handed down by the Superior Court, Luce & Company are required to pay $556,272 to 3,000 irrigation workers. The decision upheld the union's allegation that the men were required to irrigate by the flooding method, whereas the contract specified that they should receive a differential of 30 cents a day if they had to work in water. The union's attorneys who managed this important case have prepared suits against 35 other employers who used the flood method and have not paid the agreed differential. These other suits involve some 6,000 workers and the total amount at stake is approximately $2,500,000.

The legislature of Puerto Rico has recently appropriated $1,050,000 to continue the incentive program of new cane plantings for the purpose of increasing the production of sugar in the Islands, which in recent years has not been covering its market quota. The incentive payments for new plantings will be at the rate of $50.00 per acre. During 1958 total new plantings amounted to 59,000 acres, of which about 30,000 come under the incentive plan. For 1959 it is expected that the planting of 50,000 acres will be made under this plan.

During the next crop, a cooperative project to develop a mechanical cane cutter adapted to the conditions in Puerto Rico will get under way; the project is sponsored by the Puerto Rican Sugar Producers' Association, the Agricultural Experiment Station of the University of Puerto Rico and the J. & L. Engineering Co. Included in the project is an experimental test of the Cary machine which both cuts and loads. Since the test of this machine will be made in different zones, instructions have been sent to the planters, indicating the field conditions required for the test as specified by the inventor and the manufacturer.

Possible Record Crop in Louisiana

New Orleans, August 3: Despite the fact, or perhaps because of the fact that the month of July has been the wettest July in the history of the New Orleans weather bureau, the Louisiana sugar cane crop is further advanced at this writing than it has been in a number of years. Stands are good in both the plant and stubble portions of the crop and Gilbert J. Durbin, General Manager of the American Sugar Cane League, has stated in a press release dated July 27th that "the chances for a record breaking production of sugar appear good." There are, however, many fields throughout the sugar belt that were "layed-by" without the benefit of late cultivation, due to the wet weather, and the remark that the grass was growing as fast as the cane seemed to be the stock answer to inquiry regarding the crop only a few short weeks ago. Now, apparently, the cane has outgrown the grass and the prospects are very encouraging. A bad storm or an early freeze could completely change the picture but, as of now, we believe that the condition of the crop justifies the remarks by Mr. Durbin.

The practice of late summer planting is becoming more and more prevalent in Louisiana with the development of new cane varieties and the experts at the U. S. D. A. Houma Experiment Station and the Louisiana State Experiment Station are recommending that, weather permitting, from 25% to 50% of the new planting be done in August and early September. The experts say that cane planted early has the opportunity to develop a root system before the winter freezes, provided, of course, no killing freeze occurs in October or November, and it is also pointed out that by spreading the planting operations over a longer period of time less labor is needed to complete the job.

The campaign to nip the new threat of mosaic disease "in the bud" as it were, is continuing in Louisiana and Dr. E. V. Abbott, Superintendent of the U. S. D. A. Houma Station, discoverer of a new strain of mosaic in Louisiana, recently reported to the industry as follows:

"Study of the rate of spread mosaic in the spring of 1959 in the three commercial varieties presently affected, N. Co. 310, C. P. 44-101 and C. P. 52-68, has confirmed the previous observation that the disease spreads more rapidly in N. Co. 310 than in other varieties.

"Where mosaic has become generally prevalent on a plantation, with infection in the neighborhood of 25% or more, it will be difficult to control the disease by roguing, if N. Co. 310 is continued in the planting program. Although moderately to heavily mosaic-infected cane of this variety may give satisfactory yields of cane and sugar, and perhaps higher yields than other varieties that might be substituted for it, growing it will increase the difficulty of controlling mosaic in other varieties, particularly in C. P. 52-68."

"C. P. 52-68 has led all other released varieties in yields of sugar per acre in the average of results from the test fields in the Bayou Lafourche, Mississippi River, Bayou Teche, and Lafayette areas. It is therefore desirable to take advantage of its good qualities, which include high yields of cane and sugar, adaptability to machine harvesting, resistance to red rot, and better than average tolerance to stunting disease. However, mosaic markedly reduces its yields. Some mosaic has appeared in C. P. 52-68 in all parts of the district this spring, and where it has been planted near other varieties that are heavily infected, spread into it has been too rapid to expect success with roguing. In the western and northern areas of the sugar district, and those portions of the southwestern area where mosaic has not become prevalent, it is hoped that the disease can be controlled by roguing. Every effort should be made to do so."

Mexican Production At All-Time High

Mexico City, July 24: With the 1958-59 Mexican sugar cycle drawing to a close, indications are that prior production estimates will be surpassed. The National Union of Sugar Producers said that final total will be well over the 1,375,000 short ton mark, as compared to the 1,225,000 tons in the 1957-58 cycle.

This year's figure sets a new all time high for the industry, and according to the Union, nearly all 74 mills, working at full capacity, have made new production records. While figures are unavailable as yet, it is claimed that San Cristobal's record 124,000 short tons in previous cycle is "much higher" this year, with same holding true for El Mante and Xicotencatl which, together, produced 110,000 tons last year. Veracruz, Michoacan, Sinaloa and Puebla production is also at new peak levels.

Internal consumption for this year is expected to exceed a million tons, as compared to 1,030,000 tons last year, with this figure again being 47,200 tons more than in 1957.

The Union confidently stated that Mexican sugar production will continue to rise as a result of measures taken in recent months. Too, there will be no great expansion in cane cultivation, yet there is to be a highly technified drive to improve yields on present acreage through wider use of fertilizers, new high yield cane varieties, and a more efficient campaign against plague.

The sugar-chemical industry is to give a new "epoch of progress" to sugar mills, the Union said, with utilization of such byproducts as bagasse and uncrystalized sucrose. Federico Patino, head of the Union, revealed that there is a "coordination" between Petroleos Mexicanos and sugar mills so that latter can "grow in other fields for the benefit of the national economy." A citric acid plant, with the collaboration of the Stauffer Chemical Company, is to be constructed in Veracruz, with this absorbing a part of sugar surplusses as well as representing an annual savings of several millions of dollars in purchase of prime materials.

Pascual Gutierrez Roldan, head of PEMEX (Petroleos Mexicanos) told Patino, the Financiera Nacional Azucarera and the National Assoc. of Alcohol Producers that under no circumstances will the Pemex expansion into the petrochemicals division harm the sugar and allied industries. Pemex, Roldan said, will not compete with established industries for "we have much to do in other fields." Roldan said. Pemex petrochemicals plans will be of direct aid in the development of a sucrochemistry industry.

Union head Patino indicated, too, that mills are making "a great effort to amplify and modernize existing capacity and to install new mills." This will require heavy investments for, according to latest Union

(*Continued on page* 43)

ABSTRACTS–Papers Presented

At The

Tenth Congress, International Society of Sugar Cane Technologists

Dr. O. W. Willcox, Editor

Agriculture

The Influence of the Age of Sugarcane on its Leaf-Nutrient Content

G. Samuels, ISSCT, 10th Congress, Hawaii.

The age of the sugarcane plant does not exert a definite influence on the nutrient content of the sugarcane leaf. The effects of age on the leaf-nutrient (N-P-K) content were as follows:

1. The nitrogen content of the leaf decreased as the cane age increased.
2. The rate of decrease of nitrogen with age was of greater magnitude for non-irrigated than for irrigated cane.
3. The leaf nitrogen declined more rapidly for ratoons than for plant crops.
4. There was no significant difference in rate of nitrogen decline for the varieties tested: B. 41227, M. 336, and P.R. 980.
5. The time of year the leaf samples were taken did not show a significant difference on the rate of leaf-nitrogen decline with the age of cane.
6. There was a marked decrease in leaf phosphorus with age of cane for non-irrigated cane up to 4 months, and no change from 4 to 6 months.
7. Irrigated cane showed a decrease of leaf phosphorus, not quite as rapid as that shown by non-irrigated cane. This decrease was apparent until about 9 months. After this, the leaf phosphorus began to increase until a cane age of about 14 months, when once again it began to decrease.
8. Leaf potassium did not decrease with age throughout the whole growing period of the sugarcane.
9. To assist workers engaged in foliar diagnosis of sugarcane, a table of suggested correction factors for age of sampling is presented.

■

The Effect of Silvex (2,4,5-T-P) Used as a Chemical Herbicide on Sugarcane in Louisiana

E. Stamper and S. Chilton, ISSCT, 10th Congress, Hawaii.

The chemical silvex (2,4,5-T-P) was used experimentally for several years as a herbicide at 1 pound per acre on the drill as pre- and post-emergence sprays on sugarcane. In tons sugarcane per acre, there seems to be a small but rather consistent increase with silvex over dalapon, a grass herbicide, and 2,4-D and TCA in combination. This is of particular interest with silvex, since it gave considerably poorer Johnson grass seedling control than the other chemicals used as herbicides.

In pounds of 96° sugar per ton, there appears to be no significant difference. Both silvex and dalapon gave about 400 pounds more 96° sugar per acre than other chemicals used as herbicides for grass control in sugar cane.

Of the chemicals tested, silvex at one pound per acre drill application (⅓ the total area) gave excellent control of "wild lettuce" (*Lactuca* sp.) a plant resistant to 2,4-D. None of the other chemicals approached silvex in effectiveness on "wild lettuce" with the exception of amino-triazole at one pound active used on the drill (⅓ the total area).

■

Evaluating Herbicides in Sugar Cane Cultivation

E. Rochecouste, ISSCT, 10th Congress, Hawaii.

The methods used in Mauritius during the last five years are reviewed, and include a discussion on the different factors involved, such as lay-out, plot size, assessment of weed-population, assessment of weed-kill and crop injury. The practical approach of the problem is also emphasized, and the difficulties underlying the execution of such experiments are considered.

■

Recent Developments in Crop Logging of Sugar Cane

H. F. Clements, ISSCT, 10th Congress, Hawaii.

Since the previous report to the I.S.S.C.T. in 1953, several areas of crop logging have been subjected to additional studies with resulting modifications. Instead of calculating second-season nitrogen, the adequacy of nitrogen fertilization is now determined with reference to a "normal," which is determined for each age and sheath moisture level by reference to a table. The equation from which the table is calculated is the result of a very comprehensive statistical survey of logs from top yielding fields. In addition to the normal nitrogen, the study resulted in the development of an equation which can be used to determine what a particular leaf nitrogen reading would be were the sheath moisture and/or age other than they are.

To improve the precision of the log for potash fertilization guidance, the potassium content of the sheath sample is now reported on the basis of the K level in the moisture of the tissue rather than on the sugar-free dry weight. The K-H_2O basis has absorbed the discrepancies which developed with the K Index.

To reconcile effects of extremes in moisture content and vigor

(*Continued on page* 44)

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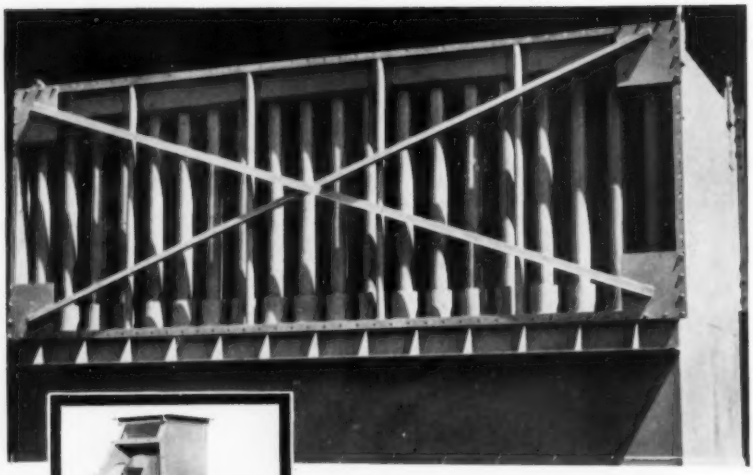
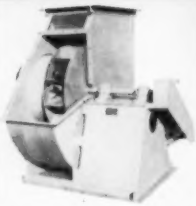
DUST COLLECTORS . . .





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Precipitation

(*Continued from page* 29)

March temperature were below normal. The yield also was below normal in three of the five years, with a mean yield of 3.21 tons per acre below the 20-year mean. In only three years was the April precipitation above normal when the March temperature was below normal. For these three years, the mean yield was 3.9 tons per acre above normal. There were five years when the April precipitation was below normal and the March temperature above normal. In four of the five years, the mean yield was 2.39 tons per acre below normal. All the evidence points to a greater effect of the April precipitation than of the March temperature, although a combination of the two shows a higher correlation than either one alone.

The correlation study was not planned prior to obtaining the data reported. After significant correlations were obtained, the question arose as to why a positive correlation was found for the month of April when the crop is small and growing slowly, as compared with the latter half of the season when the growth is very rapid. One logical answer is that when April rainfall is above normal there may be more stooling (tillering), which results in a greater number of stalks at harvest. Stalk population data are not available; however, the postulation offered here is entirely plausible.

There are of course many factors other than precipitation and temperature that affect yield. While soil fertility is often one of the main factors affecting yield, it was not important in this study. The land was well fertilized during the entire period; had all other conditions been favorable, a large crop would have been produced each year.

Summary

The simple correlations of monthly precipitation with yield of C.P. 29-116 sugarcane gave a significant positive r value for April and a fair, though not significant, value for September. The correlations of monthly temperature with yield gave a a significant positive correlation for March and a slightly significant negative correlation for August.

The significant partial correlations of precipitation and/or temperature with yield of sugarcane for April and for September differed only slightly from the simple correlations.

Multiple correlation of April precipitation and March temperature with yield gave an R value of .833, which is well above the one percent level of significance. These data show that when the March temperature and the April rainfall were above normal, the yield of cane was also above normal. Also, the yield of cane was usually above normal when either the March temperature or the April rainfall was above normal.

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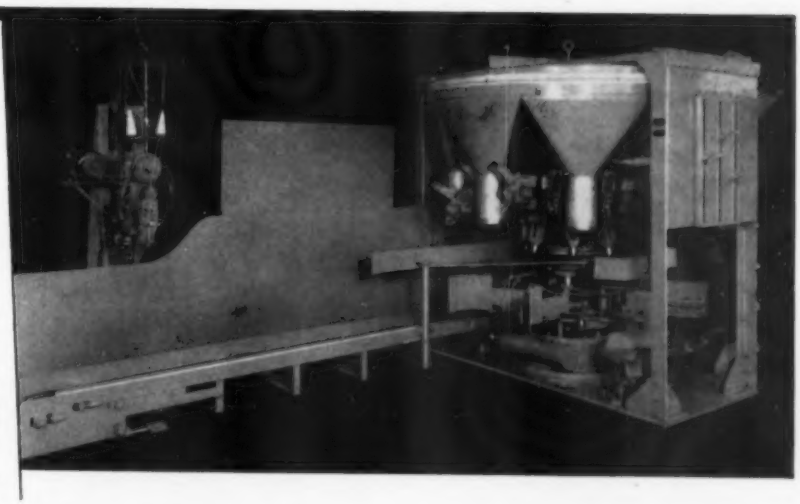

CONSOLIDATED PACKAGING MACHINERY CORP.
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Herbicides

(*Continued from page* 31)

over the seed pieces. Fig. 1 shows the appearance of the field ready to receive the pre-emergence spray.

It is preferable to apply the spray over the whole width of the rows, but to economize spray, some growers apply it only over the cane line, leaving a two or three foot untreated middle between the rows. This will require tractor cultivation of the middle until the cane closes in, and this may be difficult to do in a wet season. The field shown in Fig. 2 was virtually weed-free a month after planting. Weeds in the middles were destroyed by a cultivator. Fig. 3 shows clean rows after spraying with Telvar plus 2,4-D; inter-row spaces have been cultivated by discs, taking care not to throw soil over the treated band. Fig. 4 shows the chief disadvantage of band treatment in contrast to blanket application in a wet season. Applied over the cane line Telvar here gave excellent weed control while the inter-row spaces are completely filled with grass.

Plant cane should be treated as soon as possible after seed is covered. In ratoon cane, it should be applied to bare soil as soon as field preparation for the new ratoon crop is completed after harvest of the preceding crop.

In Hawaii each plantation that uses Telvar fits weed control into its own program, but the basic program which is similar throughout the Islands, is a two-spray program to cover the whole soil with a uniform deposit of Telvar and then to kill mechanically all established plants before the Telvar is activated by rainfall or irrigation. The first spray after planting is four to five pounds of Telvar per acre. The second spray, applied before the newly emerged cane breaks out of the spindle, consists of a contact herbicide such as aromatic oil.

The difference between 2,4-D and Telvar as pre-emergence herbicides for cane under wet conditions is highlighted by two adjoining fields in Puerto Rico. One of these fields (Fig. 5) was given a full pre-emergence treatment with Telvar; the other (Fig. 6) was treated with 2,4-D. Both fields were planted at the same time and both had received more than 25 inches of rain. Three months later, under this moist condition, the Telvar field was free from weeds: the 2,4-D field required one hand cleaning to permit correct placement of fertilizer before the cane closed in. This one hand cleaning cost $10 which brought the total weed control cost for this field to $24, compared to about $12 for the other field.

Moisture from irrigation or rainfall are required to carry these herbicides into the surface layer of soil (about one inch). The better the soil preparation the better the results, provided that the treated soil is not disturbed after application. The gallonage required varies with the type of equipment, terrain and method of culture. The following ranges are approximate:

Knapsack pumps, 20-50 gals./acre.

Power Sprayers, 15-40 gallons (mostly 25 to 30).

Airplanes, not less than 6 gals./acre.

Nozzles delivering a flat fan spray are preferred. A driving spray of coarse droplets is better than a fine mist from cone nozzles.

■

Extensive Improvements in Mauritius

During 1958 Flacq United Estates Ltd. produced 56,916 tons of sugar on the Island of Mauritius from a total of 463,401 tons of cane ground for a yield of 3.9 tons of sugar per acre. The gross profit, after providing $215,000 for depreciation, was $1,263,838; net profit was $946,299. A 10% dividend was declared. The company is engaged in an extensive housing project for its employees. A substantial quantity of new equipment was acquired for the mill following completion of the crop as part of the expansion of the mill to a capacity of 240-250 tons cane per hour. Experiments are being carried on with overhead irrigation on the new lands that are being opened to cane cultivation.

■

Sugar Proposals to European Common Market

With further reference to the bearing of the European Common Market on world sugar trade as described by Peter Runge, Vice Chairman, Tate & Lyle, at a luncheon of the New York Sugar Club (SUGAR Y AZUCAR, April 1959, page 27) two interesting proposals have recently been reported. Herr Lueckner, a member of West Germany's legislative body, proposed that the Common Market should establish a European Sugar Office to regulate imports from countries outside the Market and to establish a pool to make up for variations in supply within the Market. He also suggested a gradual leveling off of taxes within the Common Market to increase consumption. Shortly after these suggestions, the West German Sugar Association proposed to the Common Market a 3.25% tariff on sugar imported from countries outside the Common Market and the setting up of an Import Agency to establish preference duties for sugar traded in in the Common Market.

■

Inspecting bags of Taiwan sugar being discharged at the Maersk line pier in Brooklyn are Mr. C. Chao, Manager Business Department of Taiwan Sugar Corporation, Taipei, Taiwan and Mr. Sandys Bao, Director, Sugar Division of the Chinese Government Procurement & Services Mission in New York. Sugar imports from Taiwan, staunch U. S. Ally in the Pacific, are limited by U. S. quota. Sales in the U. S. are handled through B. W. Dyer & Company, Sugar Economists & Brokers.

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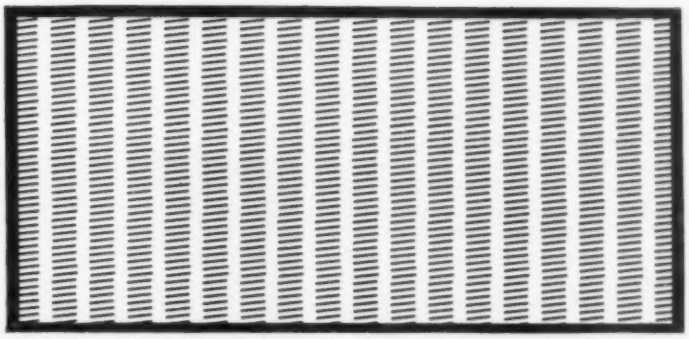

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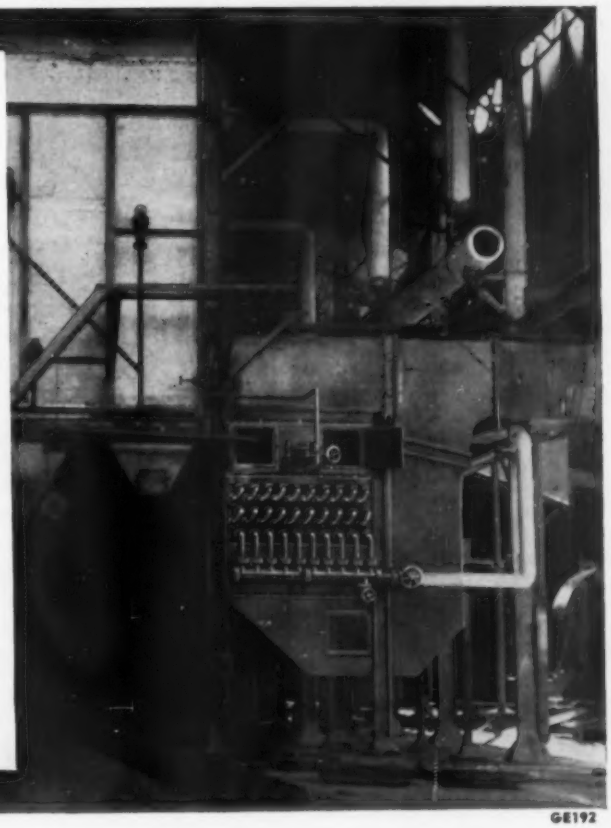

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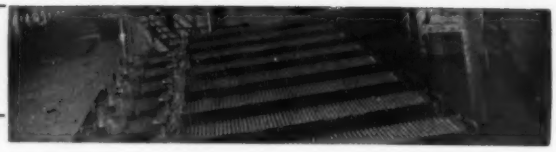


• The distinguished Executive Secretary of the Sugar Industry Technicians, **E. W. Harris** has moved to Vero Beach, Florida from the home he and his wife have occupied for more than 25 years at 130 Andrew Road, Manhasset, Long Island, on August 3rd. Mr. Harris's address in Vero Beach will be Post Office Box 833. At the urgent request of the Executive Committee of Sugar Industry Technicians, Mr. Harris

E. W. Harris

will continue in his capacity as Executive Secretary and will be in New York occasionally at the offices of the S.I.T., 150 Nassau Street, New York 38, N .Y. In addition to his work for S.I.T. Mr. Harris will be engaged in projects connected with the sugar industry with several associates. The extensive cane production of Florida will provide an ideal environment for the experimental work that will be conducted by this group.

• **Dr. Kenneth A. Sund** of Worcester, Mass. has joined the staff of the Experiment Station, Hawaiian Sugar Planters' Association as senior chemist. He will assist Dr. H. Wayne Hilton, principal chemist.

• **H. M. Robinson,** at one time treasurer and a director of Alexander & Baldwin, has been promoted from the wholely-owned Brewer Hawaiian Agronomics Co. (International) to the parent Brewer organization. He is now project coordinator for foreign operations.

Robert H. Waterman

• J. Cecil Ferguson, who has been closely associated with the sugar industry for over a quarter of a century and is now president of Ferguson Perforating & Wire Company announced recently the appointment of **Robert H. Waterman** as general manager. Mr. Waterman came to Ferguson from the position of manager of General Electric Supply Company of Providence, R. I.

• **James C. P. Chen,** Sugar Technologist and co-developer of the Middle Juice Carbonation Process is now engaged as Research Technologist for the Empresa Agricola Chicama Ltd. of Peru. Mr. Chen has been Technical Adviser to the National Economic Development Corporation of Thailand and for the last three years has devoted his time to the development and improvement of the Thailand Sugar industry. He has written several articles on this subject.

James C. P. Chen

• **Franklin Farrel, 3rd,** President of Farrel-Birmingham Company, Inc., is shown receiving his 25-year company service pin from his father (left) Franklin Farrel, Jr. who himself was an executive of the firm for 41 years prior to his retirement as chairman of the board in 1945.

Franklin Farrel, Jr. & Franklin Farrel, 3rd

• **Robert Mott-Smith,** who spent two years with the Taiwan sugar industry after World War II and more recently has been with Hutchinson Sugar Plantation Co. in Hawaii, is now factory superintendent of Hawaiian Agricultural Co. He replaces George Becker who will take partial sick leave from that position but will remain on a consultative basis.

• **Herbert R. Corsberg,** general auditor of the Great Western Sugar Company, Denver was elected a director of the Rocky Mountain Control of the Controllers Institute of America. At the annual meeting of the Institute's Puerto Rico Control, **Ramon Rivas,** treasurer-comptroller of Fajardo Sugar Company, Fajardo, was renamed a director. The Institute is a non-profit management organization of Controllers and finance officers from all lines of business.

Facts About Sugar

(*Continued from page* 36)

data, 150 million pesos ($12,000,000) are required for machinery and installations capable of producing 75,500 short tons annually."

Governor Francisco Martinez de la Vega, of the State of San Luis Potosi, revealed that two mills, at a total cost of 150 million pesos ($12,000,000) will be constructed in the near future. Mills will be in production within 15 months, said Gov. de la Vega, who also revealed that 2,500 tons of sugar cane were lost in San Luis Potosi this year for lack of additional facilities. These will be medium sized mills, with total production for each at around 30,000 tons.

On the international front, the Union of Sugar Producers predicted that when the cycle ends Mexico will have an excess of 375,000 tons, as compared with 220,000 last year. This creates the problem of storage and warehousing costs which run to several million pesos annually. Therefore, drive will be resumed to come to an agreement with the U. S. to ship at least 200,000 short tons annually north of the border. With the 82,500 tons allotted by the International Sugar Agreement, Mexico's surplus problem can become more or less normalized until the day when a growing sucrochemical industry starts absorbing more and more sugar.

Union head Patino freely predicted that within the next six years Mexico's sugar industry will hit new expansion highs. He stated that value of sugar production alone now stands at over 1,700,000,000 pesos ($136,000,000). This figure will rapidly soar, he added, and he also had praise for U. S. Ambassador Robert C. Hill, who has an "understanding" of Mexico's sugar problem and who is offering "valuable collaboration" in the attempt to obtain higher U. S. quotas.

Hawaiian Deficit Set At 100,000 Tons

Hawaii has reduced its estimate of raw sugar production for 1959 by 140,000 tons. Light stands of cane and poor juices, resulting from the four month strike of plantation labor in 1958, are blamed for the reduction.

Futher evidence of the seriousness of the loss in the Hawaiian industry is found in the announcement by Ewa Plantation Co., which probably suffered most heavily of any company as a result of the strike, that they would finish grinding the 1959 crop by August 3. This is earlier than the company has finished its grind in recent history. The per-acre yield of sugar is expected to be about eight tons per acre, compared to its normal crop of 14 tons. Production this year will be some 34,000 tons whereas the usual outturn is about 60,000 tons.

Oahu Sugar Co. has announced that they expect a loss on sugar operations during the current year of approximately $650,000. Under normal conditions the company would have exceeded 71,500 tons of raws. Production will be about 57,000 tons this year.

Dr. John H. Payne, principal technologist of the Experiment Station, Hawaiian Sugar Planters' Assn., has been elected vice-chairman for the Hawaiian Section of the International Society of Sugar Cane Technologists for the 11th Congress, which will be held in Mauritius in 1962.

Dr. Payne was vice-chairman of the program and publications committee for the recent 10th Congress, held in Hawaii.

Boyd MacNaughton, president of C. Brewer & Co. of Honolulu, Hawaii, spoke before the San Francisco Society of Security Analysts recently. He told them that a paper industry for the Islands is certain. However, "At this time I am not in a position to predict exactly how or when it will be accomplished, but I am confident that sooner or later we will upgrade our cane fibre from fuel for our factories to a commercial raw material for paper. Consequently, Brewer has, as its major objective for diversification of our business, a part in the paper industry and utilization of our own raw material resources," said Mr. MacNaughton.

(Brewer stock is already heavily held by investors in the U. S. Pacific Northwest. Rumors are now circulating in Hawaii that Weyerhaueuser interests, one of the largest lumber, pulp and paper organizations, hold Brewer stock.)

Mr. MacNaughton also told the security analysts that Brewer's Hawaiian Agronomics Co. (International), which is now handling a sugar plantation development in Iran, is only interested in exporting its know-how for a fee. He said, "We are not contemplating important investment abroad. We would confine ourselves largely to participating management contracts, at least until such time as we may have had more experience in foreign operations."

Hawaiian Commercial & Sugar Co. have two Teflon-coated moldboard plow-type lineshapers in operation for ratoon-crop culture. Both show increased productivity over standard lineshapers.

HC&S has decided to equip 10 more Caterpillar D-6 and TD-14 tractors with similar modified versions of these John Deere ditching plows.

Overproduction Threatens Brazil

Rio de Janeiro, July 27: Statistics published by the Sugar Institute relating to the 1958-59 season, ended May 31, quote production of *usina* sugar to March 31st at 3,422,620 short tons, or 98.5% of the estimated total for the season. Compared with 1957-58 at the same date production increased by 18.1%, domestic consumption by 15.1%, to 2,201,192 t., exports by 18.2%, to 772,356 t., and stocks on hand at March 31 by 12.3%, to 848,491 t. By April 30, according to advance figures announced by the Institute, production had exceeded the estimated total for the season by 78,861 tons.

As regards the prospects for 1959-60 Pernambuco plantations benefited by generous rains in June, eliminating the threat of another drought and accelerating cane growth. In the south weather has also been favorable, promising increased yields, and the Institute is beginning to face the problem of overproduction. Brazilian production has increased by 111% since 1950-51, by 31% in the north and 194% in the more highly developed south. So far it has been possible to export the surplus over domestic requirements owing to exceptional conditions in world markets, but future expansion will depend almost entirely on internal developments, since exports are now restricted under the International Sugar Agreement. For this reason production of *usina* sugar in 1959-60 is provisionally fixed at 3,359,000 short tons, instead of at 3,894,000, the estimate based on possible production. The greater part of the forced curtailment will fall on Sao Paulo, where the estimated outturn of 1,842,786 tons is cut by 463,056. Pernambuco and Rio, the next biggest producers, will suffer contingent cuts of 65,802 and 40,788 tons, respectively.

Brazilian Sugar Production

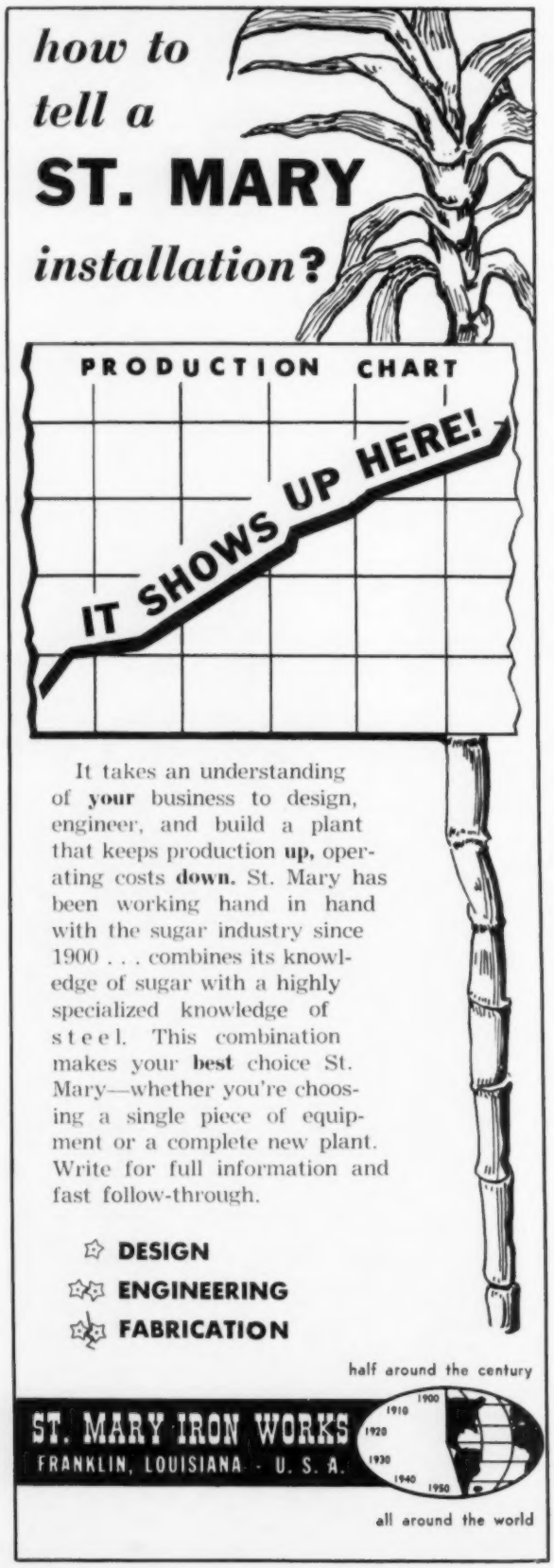
	Short Tons
Total 1957	**2,985,569**
Total 1958	**3,303,974**
Jan. 1 to March 31, 1958	**462,153**
Jan. 1 to March 31, 1959	**611,304**

Plans for the 1959-60 season have been carefully worked out by the Institute in consultation with cane growers and mill-owners, in order to avoid upsetting the balance between production and consumption. For the first time in Brazil the date for suspending crushing has been fixed, namely at December 31 in the south and March 31, 1960, in the north. The starting dates (June 1 in the south and September 1 in the north) are unaltered. Within these periods the output of any mill may not exceed the official quota, plus the amount of extra-limit production authorized for exportation.

The surplus of *usina* sugar, required for the domestic market and to comply with international obligations, is fixed at 3,359,056 short tons, comprising 2,640,000 tons for internal consumption, 609,572 for the free world market, 76,196 as a reserve held at the discretion of the International Council and 33,288 tons for purposes of statistical adjustment.

The total of 3,359,056 tons is made up of the intra-limit production quotas of each state, estimated at 2,954,368 tons, plus 404,688 tons of extra-limit production authorized for exportation, of which 384,059 tons are allotted to Sao Paulo. Intra-limit production includes 268,253 tons for exportation, chiefly from Pernambuco.

The biggest quotas of intra-limit production pertain to Sao Paulo (995,662 tons), Pernambuco (838,200), Rio de Janeiro (414,181) and Alagoas (264,000).



Abstracts

(*Continued from page* 37)

in the P Index, this index was standardized for a particular moisture and total sugar level, creating the Standard Phosphorus Index. Now, a recently matured internode (the fifth internode down from the one still carrying a living leaf) is also analyzed for phosphorus. The SPI as parts per hundred thousand, as well as the P content of the "fifth" on the same basis, are multiplied to give an amplified phosphorus reading—the API. Results so far have been good.

A comprehensive study of calcium and pH effects is now under way since experiments recently harvested show responses to calcium carbonate beyond those expected for calcium as a nutrient. Magnesium, sulfur, silicon, and the five minor elements are included in the recent studies.

■

Pathology

Sugar Cane Quarantine as Conducted in Different Countries

In order to guard against potential losses from new diseases and insects most countries import varieties only through a quarantine system which has received governmental approval. The quarantine regulations, procedures and facilities for importing varieties into Hawaii, Java, Madagascar, Mauritius, New South Wales and Fiji, Philippine Islands, Queensland, South Africa, Taiwan and the United States are discussed in the following papers:

Sugar Cane Quarantine in Hawaii (J. P. Martin).

Organization and Maintenance of Quarantine in Relation to Sugar Cane Coming into Java (Han Lioe Hong).

Organization and Maintenance of Quarantine in Relation to Sugar Cane Coming into Madagascar (H. M. Barat).

Organization and Maintenance of Sugar Cane Quarantine in Mauritius (P. O. Wiehe).

Quarantine Procedure in New South Wales and Fiji (E. G. Baber and P. B. Hutchinson).

■

Breeding

A Progressive Report on the Development of P. T. Seedlings in Taiwan

C. S. Loh, ISSCT, 10th Congress, Hawaii.

For fifty years, the commercial varieties of sugarcane in Taiwan were mostly of soft-cane varieties and heavy losses had been suffered due to the occurrence of typhoons and serious infestation of sugarcane borer. The breeding for hard-cane varieties of sugarcane to increase the toughness of the standing cane to maintain the growth potentiality of the stool is particularly important in yield of tonnage per hectare. The number of millable stalks per hectare at harvest was found to be the limiting factor in yield of sugarcane in Taiwan. The disease of mosaic and downy mildew of sugarcane menaced the existence of the Taiwan sugar industry. One of the superior high yielding varieties, P.T. 43-52, had been suspended from commercial planting due to the susceptibility to downy mildew disease. The successful transference of resistant gene or genes from the resistant varieties to P.T. 43-52 has produced from moderately to very resistant varieties to downy mildew disease as well as to mosaic disease.

The release of P.T. 51-11 will enable the Taiwan sugar industry to regain the better land for sugar production. P.T. 52-50 and P.T. 51-204, to be released in 1959, are also of promise.

■

The 1957 New Guinea Expedition

J. N. WARNER and C. O. GRASSL, *ISSCT, 10th Congress, Hawaii*

The 1957 New Guinea Expedition was sponsored by the United States Department of Agriculture to collect new sugarcane germplasm. Cooperating institutions were the Experiment Station, H.S.P.A., and the Bureau of Sugar Experiment Stations, Queensland, Australia.

The expedition visited areas in Dutch and Australian New Guinea and the Solomon Islands hitherto unexplored, or inadequately explored, for sugarcane. Of particular interest were the Sepik and Lower Ramu Rivers and the lower elevations along the northern coast of New Guinea.

Collections were made of *Saccharum officinarum, S. robustum, S. spontaneum* and *S. edule* and will be available to sugarcane breeders following release from quarantine.

■

Method of Determining Brix with the Hand Refractometer in Selecting Sugarcane Seedlings

L. P. HEBERT, *ISSCT, 10th Congress, Hawaii*

The hand refractometer is used extensively to measure Brix, or juice density, of standing sugarcane in Louisiana and other sugarcane-growing areas. Variation occurs among individual stalks and among the internodes of any single stalk, within a variety. There is a significant interaction between varieties and date of sampling, and differences observed between any two varieties at one date may be completely reversed at another date.

It is concluded that hand refractometer Brix of any of the groupings as defined in this report, i.e., (1) the average of 5 internodes taken at the mid-point of the mature stalks, (2) the average Brix of the top mature internode plus the third one from the bottom, and (3) the simple average of all internodes of 5 stalks, could be used in evaluating any variety for Brix content at any date during the harvest season. It is also concluded that method No. 1 (the Brix of the middle internode of 5 mature stalks) is the most rapid one and the easiest to use. Results of these tests showed that individual stalks of a clone are highly variable (coefficient of variability of 14.02 versus 4.99 for whole stool of the same clone) and that single stalks could not be used in determining Brix with any degree of reliability. The progenies of 7 crosses studied were more variable than individual stalks of a variety.

■

Studies in Saccharum spontaneum—Preliminary Studies in Inbreeding

R. R. PANJE and A. S. ETHIRAJAN, *ISSCT, 10th Congress, Hawaii*

This paper presents preliminary observations made on selfed progenies of 15 genetic stocks of *Saccharum spontaneum* having certain desirable characters. A total of 819 S_1 seedlings were under study. The parents differed in the extent of their self-fertility. The size of the progenies ranged from 351 seedlings in SES 182 to a single seedling in SES 113A.

Selfing in *spontaneum,* unlike in *officinarum* and certain hybrid canes, does not result in any loss of vigour in the S_1 and

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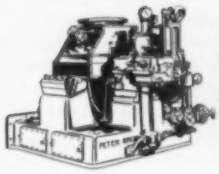

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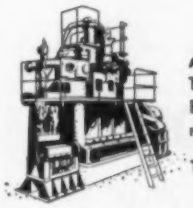

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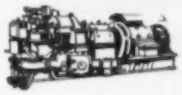

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S_2 generations. In the inbred materials, types generally resembling the parent were obtained. However, in the stem and leaf characters of the individual plants, there were considerable deviations from the parents; many of the seedlings exceeded their respective parents in (a) blade length and width, and (b) stalk girth and height; the percentage of the former was more than of the latter. As between stem and leaf characters, the latter showed greater variation in S_1. About 20% of the S_1 plants were on the whole superior to their respective parents. Flowering was sparser and later in the progenies than in the parents, but this may perhaps be because the seedlings were raised from seed and the parents were raised from setts. The order of flowering of the parents was maintained in the progenies. Protogyny, a parental character of SES 505 (Giza) was recovered in its progeny; but in the case of SES 154B, its floral abnormalities such as duplication of lodicules, palea and essential organs were not carried over to the off-spring.

The rating of seedlings for red rot resistance by field inoculation has not given any definite indication of improvement through selfing. In sucrose content, however, some of the S_1 derivatives of two variants SES 182 and SES 205A, have shown an intensification of the character.

■

Factory

Reabsorption—A Limiting Factor in Mill Performance

W. CRAWFORD, *ISSCT, 10th Congress, Hawaii.*

The phenomenon known as reabsorption is examined from both theoretical and experimental viewpoints. Reabsorption is characterized by a no-void bagasse volume in excess of the volume escribed by the delivery rolls of a mill, and Egeter held the view that this was due to forward flow of free juice relative to the bagasse blanket, i.e. by juice passing through the work opening at a speed greater than that of the rolls and the solid part of the blanket.

This hypothesis requires that the plane of maximum pressure shall be in front of the plane of closest approach of the rolls. Reasons for this have not previously been put forward, and to this end the present paper makes an approximate theoretical examination of the behaviour of a cane mat in passing between a pair of rollers.

This analysis defines as "effective" pressure, that part of the pressure carried by the solid material of the blanket, and an expression is developed for the rate of increase of the horizontal effective pressure with respect to distance from the plans of closest approach, in terms of the effective radial pressure, the frictional forces on the rolls, density of the blanket, peripheral speed and the geometry of the system.

It is shown that the plane of maximum pressure can only move back from the plane of closest approach if the frictional drag of the rolls becomes negative, that is to say if the blanket is moving forward relative to the rolls. It follows that reabsorption is initiated by extrusion of the blanket. Linley also held this view and Van Hengel and Douwes-Dekker have found practical evidence of its truth.

Experimental examination of the reabsorption phenomenon has been restricted to the Institute Experimental Mill, operating as a cane mill. The onset of reabsorption is largely controlled by pressure required to compress, and express juice, from the blanket at various stages in its progress through the rolls, and it has been shown that this depends on fibre rate, work opening, roller speed and preparation of the cane.

Thus: (1) Low fibre canes lead to low losses due to reabsorption, and vice versa.

(2) The time from beginning to end of a squeeze in relation to the extraction sought is an important factor. The greater the time the less the reabsorption.

(3) Reabsorption is less with finely prepared cane.

(4) It may be possible to reach a stage where the reabsorption loss increases more rapidly than the extraction gain, so resulting in a maximum extraction.

■

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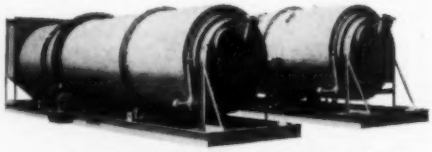

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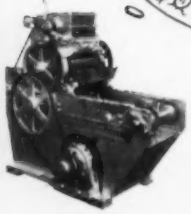

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Sucrose Crystal Growth

H. E. C. Powers, ISSCT, 10th Congress, Hawaii.

Much of the published work upon Sucrose Crystal Growth has perhaps tacitly assumed that under standard conditions of purity and supersaturation, etc., the rate of growth per unit area of all crystals will be equal. This is not true. Even when immersed in the same solution, some crystals grow rapidly, others slowly. Some surfaces of a single crystal grow more rapidly than others. Even upon a single face of one crystal there are surges in the rate of growth.

Since "the rate of growth is largely dependent upon the interfacial reaction rather than diffusion, viscosity, etc." (van Hook) a study of this surface reaction may indicate ways in which the over-all rate of growth could be greatly speeded up. The author describes new techniques designed to throw further light upon the mechanism of growth. Individual crystals are grown under controlled conditions, the action being followed under the microscope, using photography, cine micrography, etc., to record the developments. Rate of growth, to a certain extent, is connected with the degree of perfection of crystal

form. The above techniques facilitate a study of this subject and, in particular, the manner of production of inclusions of mother liquor and of foreign matter. The paper concludes with a few notes about those little known subjects, nucleation, also solubility and growth of the sub-micron sized crystal.

■

Improved Saturation Cell and a Laboratory Vacuum Pan for Research Work

G. Rush and C. Meredyth, ISSCT, 10th Congress, Hawaii.

Two small-scale pieces of equipment used to study sucrose crystallization are described. One is an improved version of the Harman saturation cell (4th Proceedings, 1932, Bulletin 98) and the other is a half-gallon size vacuum pan.

The saturation cell has been fitted with an automatic temperature regulating device which is an improvement on the manual control previously described.

The half-gallon pan was originally set up nearly 25 years ago. Modifications, slowly developed as experience was gained and demands increased, have now produced a highly versatile and most useful piece of equipment which does not appear to have a counterpart in other sugar laboratories.

■

Entomology

Studies on the Control of Termites in Sugarcane

B. D. GUPTA, *ISSCT, 10th Congress, Hawaii*

Termites are one of the greatest enemies of the sugarcane farmers. Their ravages begin from the very planting of the canes. Gappy stand of the crop is due to the mortality of the eyebuds during the period of germination; as about 40 to 60 per cent of the eyebuds planted are destroyed by the termites alone. Efforts have been made since 1934 to find out some suitable termitifuges for ensuring better germination: studies carried out during the period 1934-54 reveal vegetable origin as well as inorganic and organic chemicals have given detailed trials for control of termites. The first named has also included barks, leaves or roots of the indigenous plants known to be of medicinal value as also insecticidal in action.

Out of the various indigenous plants, *Bach* (*Acorus calamus* Linn.) rhizomes proved very effective when used with Copper sulphate (2:1). But owing to too many hardships faced in procuring and processing the rhizomes the treatment could never find favour with the farmers. This was later on replaced with other potent inorganic chemicals such as lead arsenate, Mercuric chloride and lime, etc. Thus it is observed that the main effective termitifuges and the mode of their application during pre-second-world-war period were (i) soaking the seed cane pieces for 24 hours in 2 per cent Phenyle water, or (ii) in lime and lead arsenate (10:1) solution or (iii) dipping the cane setts for about 15 minutes in 2 per cent Corrosive sublimate solution and planting when dry.

In the post-war period insecticides like DDT, BHC, Chlordane, Aldrin and Dieldrin have been extensively used. Out of these BHC, Chlordane and Aldrin have proved to be very good insecticides for eradicating termites from the crop, when applied in the form of dust at 1 lb. actual chemical per acre. Dipping of setts in BHC, Chlordane, Aldrin and Dieldrin 0.25-0.5 per cent suspension or emulsion is also effective not only in affording maximum protection to the eye-buds but also in ensuring better germination. Out of these, Chlordane application has been observed to produce harmonic effects in the crop resulting in greater yield; while application of Aldrin as dust or emulsion remains effective throughout the crop season and consequently proves the best of the lot and cheapest.

■

Sugarcane Stalk Weevil

S. FLORES and A. GONZALEZ, *ISSCT, 10th Congress, Hawaii*

Since 1902 Champion has reported six species of *Cholus* from Mexico. In 1948, *Cholus morio* Champ. was first determined as a curculionid beetle pest of sugarcane in South Cuernavaca, Mexico. The areas where this beetle causes the greatest damage are at altitudes of about 3,000 feet where the climate is mild to hot. It usually attacks the first and second ratoons and rarely plant cane.

Control consists of dust applications of BHC 3%, Aldrin 2.5% or Dieldrin 1.5%, in amounts of about 10 to 12 pounds per acre, applied to the foliage as soon as the pest is detected. Two dustings are applied in the same amounts at an interval of two weeks. In heavily infested ratoons all trash should be burned or removed after harvest and the stools shaved at soil level or below. It is also recommended in such fields of ratoons that the sides of the furrows be opened and 20 pounds of 3% BHC applied and covered. No parasites or predators of this pest have been found.

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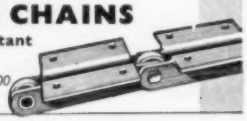

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An Invitation

Annual Meeting Puerto Rican Sugar Technologists

A CORDIAL invitation is extended to sugar technologists throughout the world to attend the Annual Meeting of Association of Sugar Technologists of Puerto Rico by the President and Executive Committee. The meeting will be held in San Juan, Puerto Rico, on December 3rd, 4th and 5th. A program of exceptional interest is planned. The problems encountered in the growing, transportation and manufacture of raw and refined sugar in Puerto Rico are so typical of those found in many of the principal sugar producing countries that Harold A. Willett, President, Charles Haeussler, Vice-president, Miguel Capllonch, Treasurer and Rafael Hilera, Secretary of the Association feel that visitors from other sugar areas may well find this year's meeting of great practical interest. There will be several important papers on Agronomy, Economics, Engineering, Chemistry and By-Products. Each of the papers will be followed by a period of discussion in which visitors are urged to participate. Visits to the Experiment Station and to mills and plantations are being arranged. Tentative plans call for holding the meeting at the Caribe Hilton Hotel in San Juan. Those desiring to accept the invitation of the Association should communicate with President Harold A. Willett, Central Cortada, Post Office Box 477, Santa Isabel, Puerto Rico. Mr. Willett will be happy to assist in making hotel and other arrangements for visitors.

■

John McMahon

John W. McMahon, superintendent of the old National Sugar Refinery, died at his home in Yonkers. He was ninety-three years old. He devoted his life to the sugar industry, joining the Refinery in Yonkers in 1893. His father before him was a sugar sampler.

■

Automatic Pan Control Described To Zerban Group

W. S. Taylor of Minneapolis Honeywell Company addressed the Zerban Sugarmens' Association luncheon at the July meeting in the Chemists Club, New York on July 15th. To obtain accurate results from a completely automatic vacuum pan it is necessary to measure, control and hold as constant as possible the variables which are listed as: vacuum, steam, level, mobility and super saturation, said Mr. Taylor. Each of the variables sequence the operation when conditions vary, in the system described, in contrast to systems employing time programming based on the assumption that steam, feed, etc. will be constant which is not always the case. With the aid of a diagram of a complete recording and control system for vacuum pan operation, Mr. Taylor described the instruments involved and the functions they performed, each depending on a measurement of the variables that might affect its operation.

■

Francis L. Mottram

After several months of illness, Francis L. Mottram, Chairman of the Board of Factory Sales and Engineering, Inc., New Orleans, Louisiana, died on July 22, 1959. Mr. Mottram was connected with the sugar industry throughout his career which began as a sugar technologist with the Cuban American Sugar Company, Inc. In 1935 he formed the Factory Sales and Engineering, Inc., and remained active in this enterprise until his death.

■

Beet Sugar Machinery For Russia

An order for 20 crystallizers and 15 vacuum pumps for use in existing beet sugar factories of the Soviet Union was placed with George Fletcher & Company Ltd. Value of the order according to C. W. Murray, Chairman and Managing Director of Fletcher, was £150,000. Just prior to the placement of the order a group of Russian sugar technologists had visited two of the factories of the British Sugar Corporation and the manufacturing plant of the George Fletcher Company.

■

British Columbia Refining Company Indicted

An indictment charging the British Columbia Sugar Refining Co. Ltd. and the B.C. Sugar Refinery Ltd. with forming a combine in the four western Provinces of Canada was filed in Court of Queen's Bench at Winnipeg. The indictment charges that B.C. Sugar Refinery Ltd. acquired control over the business of the Manitoba Sugar Co. Ltd. thus forming a merger or trust which has operated or is likely to operate to the detriment of the public. In addition the indictment charges that Canadian Sugar Factories Ltd., Manitoba Sugar Ltd., B.C. Sugar Refining Co. (Alberta) and B.C. Sugar Refining Co. (Saskatchewan) controlling the sugar industry in the four western provinces, operate against the public interest. The case will come before Court of Queen's Bench at the next assizes in October 1959.

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AZÚCAR

Septiembre 1959

Estudios de Correlación en Georgia

Efecto de la Lluvia y Temperatura en los Rendimientos de Caña

Por E. S. Lyons

Ex Agrónomo Investigador, División de Estudios de Cosechas, Servicio de Estudios Agrícolas, Departamento de Agricultura de E.U.A., Cairo, Georgia

AUNQUE los efectos del clima, especialmente de la lluvia y de la temperatura, sobre el desarrollo de plantas alimenticias son bien conocidos y se discuten en muchos artículos, informes y trabajos científicos, existen pocos datos sobre la relación entre el clima y los rendimientos de plantas alimenticias.

Los efectos de lluvias temporales y de la temperatura sobre los rendimientos de caña de azúcar a menudo se toman como factores importantes en la interpretación de datos de experimentos agronómicos en la U. S. Sugar Crops Field Station, Cairo, Georgia. Los datos de rendimiento de una sola variedad, la C.P. 29-116, y los registros de lluvia y temperatura abarcando un período de 20 años permitieron iniciar un estudio de la correlación de estos factores climáticos con los rendimientos. La información que sigue pueder ser útil en el pronóstico de rendimientos antes de la recolección y se podría aprovechar en parte en regiones productoras de caña, donde las condiciones climáticas son similares a las del Sudoeste de Georgia.

Se determinaron correlaciones mensuales de los rendimientos de caña por acre con la lluvia y/o temperatura para los meses de enero a octubre. La cosecha suele recogerse en noviembre. Los datos de correlaciones simples y el valor *R* necesario para ser significante a niveles de 5% y de 1% se dan en la Tabla 1.

TABLA 1

Correlación de la Precipitación y la Temperatura con el Rendimiento por Acre de Caña C.P. 29-116 en Cairo, Georgia, Durante el Período de 20 Años (1937-1956).

	Valores *R* o Correlación Entre:	
Período	Rendimiento y Precipitación	Rendimiento y Temperatura
Enero-Octubre	.392	.272
Marzo-Octubre	.376	.205
Enero	.152	.058
Febrero	.161	.258
Marzo	.007	.547*
Abril	.627**	.160
Mayo	—.244	.323
Junio	—.161	.036
Julio	.129	—.244
Agosto	.205	—.447*
Septiembre	.423	—.014
Octubre	.072	—.292

Valor *R* necesario para ser significante: .05 = .444, y .01 = .561.

* Significante al nivel de 5%.

** Significante al nivel de 1%.

Abril fue el único mes que acusó una correlación significante entre los rendimientos de caña y la precipitación. Las correlaciones para los otros meses son bajas, con la excepción de septiembre, para el cual la correlación es algo inferior a la necesaria para ser significante al nivel de uno por ciento. Cuando se tomó la lluvia total para el período de enero a octubre o de marzo a octubre, el valor de la correlación fue algo por debajo del nivel de cinco por ciento.

Hubo dos meses para los cuales las correlaciones entre rendimiento y temperatura fueron significantes. La correlación para marzo fue positiva y algo por debajo del nivel de uno por ciento para ser significante, mientras que la correlación para agosto fue negativa y algo por encima del nivel de uno por ciento. Se determinaron correlaciones parciales para los datos correspondientes a los meses de abril y septiembre (Tabla 2). Cuando se tomaron los datos de precipitación y rendimiento, eliminando la temperatura, el coeficiente parcial fue .614 para abril y .431 para septiembre (el valor *R* necesario para ser significante al nivel de cinco por ciento fue 0.545 y al nivel de uno por ciento fue 0.647). La correlación parcial para estos meses varió muy poco de la correlación simple entre la precipitación y el rendimiento. Esto parece indicar que la escasa correlación encontrada entre la precipitación y los rendimientos se debió al efecto de la temperatura cuando ambos factores correspondían al mismo mes.

La correlación parcial entre la temperatura y el rendimiento, eliminando el efecto de la precipitación, fue .236 para abril y .228 para septiembre. Ni uno ni otro alcanzan el nivel significante de cinco por ciento, pero ambos valores son algo más altos que la correlación simple entre temperatura y rendimiento. Estos datos indican que el efecto de la precipitación es escaso cuando se elimina en una correlación parcial entre la temperatura y el rendimiento de caña; indican también que la temperatura y/o la precipitación surten escaso efecto mutuo cuando se toman para el mismo mes.

TABLA 2

Correlaciones Parciales de Rendimiento de Caña C.P. 29-116 con la Precipitación y/o Temperatura en Abril y Septiembre en la U. S. Sugar Crops Field Station, Cairo, Georgia, Durante el Período de 20 Años (1937-1956)

Factores Correlacionados	Coeficiente de Correlación Parcial
Rendimiento y Precipitación en Abril	
Eliminado la Temperatura en Abril	.614*
Rendimiento y Temperatura en Abril	
Eliminando la Precipitación en Abril	.236
Rendimiento y Precipitación en Sept.	
Eliminando la Temperatura en Sept.	.431
Rendimiento y Temperatura en Sept.	
Eliminando la Precipitación en Sept.	.228

Valar *R* necesario para ser significante: .05 = .545, y .01 = .647.

*Significante al nivel de 5%.

Ya que se encontraron significantes correlaciones simples entre la precipitación y el rendimiento para abril y entre la temperatura y rendimiento para marzo, ¿cuál sería el resultado de una correlación múltiple o del efecto combinado de la temperatura de marzo y la precipitación de abril en el rendimiento? Cuando se calculó esta correlación múltiple (*R*), el valor *R* fue 0.833; el uno por ciento necesario para ser significante fue solamente 0.647. Esto demuestra que los valores de temperatura en marzo y precipitación en abril tenían relación en su efecto sobre el rendimiento, ya que la correlación múltiple fue considerablemente más alta que la correlación simple entre la precipitación de abril o temperatura de marzo y el rendimiento.

Durante los siete años que la precipitación en abril y temperatura en marzo pasaron de lo normal, el rendimiento promedio de caña por acre fue 3.33 toneladas sobre el promedio de 20 años. Hubo cinco años en que la precipitación en abril y la tem-

(Sigue en la página 74)

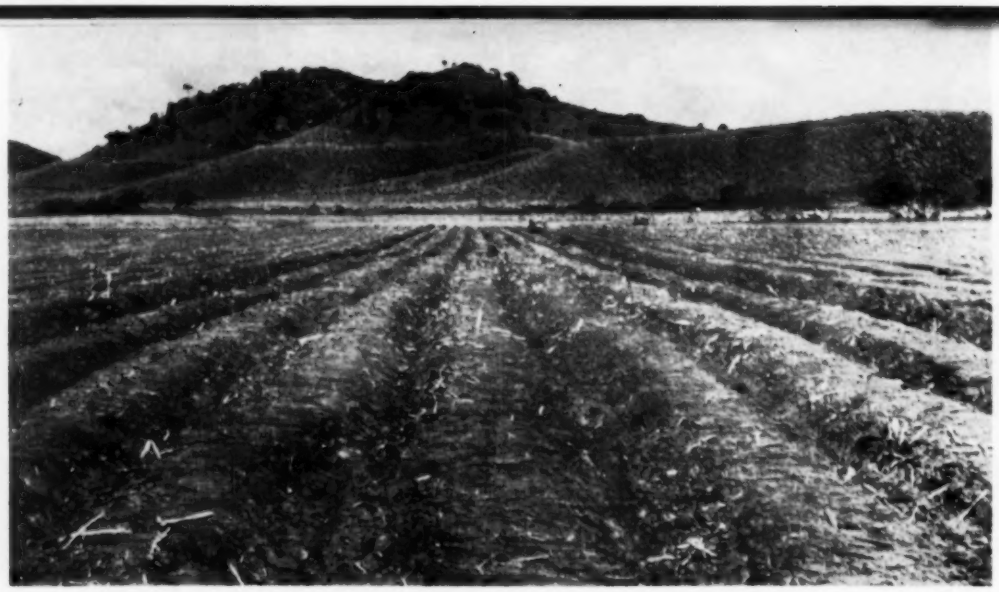


Figura 1

Empleo de Herbicidas Antes de la Germinación Reduce los Costos de Trabajos Manuales

Jack R. Nail, William R. Irey and Eduardo W. Zomosa,
E. I. du Pont de Nemours & Company

Uno de los factores básicos en la economía de la industria de la caña de azúcar es el costo de la mano de obra que se requiere para producir la cosecha de caña, y una de las principales partidas en este costo es el costo de mantener los cañaverales libres de maleza.

Hay dos métodos principales para contener la maleza: uno de ellos es el trabajo manual con azadón y cultivadora mecánica; el otro es la destrucción de la maleza con substancias químicas aplicadas por aspersión o espolvoreo. Todo método seguido para erradicar la maleza en cañaverales tiene que ser comparado con el costo del método manual. El trabajo manual puede conservar los cañaverales prácticamente libres de maleza en casi cualquier condición de crecimiento, siempre que se cuente con la fuerza de brazos necesaria y el cosechero esté dispuesto a cubrir el costo. Pero el logro de este ideal rara vez resulta práctico. Por una parte, sería necesario mantener una fuerza de brazos prohibitiva para conservar los cañaverales libres de maleza durante la estación lluviosa o en la temporada de exceso de trabajo, como en las épocas de siembra y recolección. Por otra parte, a medida que las exigencias de brazos para otras fases de la producción de caña van disminuyendo por la mecanización, los cosecheros contarán con menos fuerza de brazos para los trabajos de desyerbe durante el período entre la siembra y el cierre de la cosecha.

Figura 2

Los datos tomados de centrales azucareros en Puerto Rico indican que el trabajo de desyerbe manual representó del 15 al 20% de los costos de producción en 1954, necesitando de cinco a ocho hombre—días para la primera faena de azadón solamente, y de 20 a 30 hombre-días para las labores de azadón durante la temporada. En los centrales que adoptaron el sistema de cultivo mecánico y la aplicación de herbicidas antes de la germinación, el costo de desyerbe fue reducido alrededor de ocho por ciento del costo total de producción por acre, y ahora dos hombre-días por acre son suficientes para realizar todo el trabajo de desyerbe que sea necesario. En la República Dominicana, la práctica de tratar el suelo con 2,4-D además del desyerbe manual requiere de 10 a 12 días. Pero se estima que con el emplea de herbicidadas antes de la germinación, la fuerza de brazos podría ser reducida a diez-hombre días y posiblemente hasta un mínimo de cuatro hombre-días.

La fuerza de brazos que se necesita para contener la maleza depende de la población de yerbajos y del grado de represiõn que se desee. Los factores dominantes son la precipitación y su distribución estacional. En las regiones más áridas de Mauricio, donde la lluvia promedia es de 30 pulgadas, tres desyerbes cada temporada son suficientes. Esto equivale a 12 hombre-días por acre. Donde la lluvia en regiones más húmedas alcanza 136 pulgadas, se puede necesitar un total de 40 hombre-días por acre. El efecto de la distribución estacional de la lluvia puede verse en África del Sur. En la región de Felixton, la lluvia anual de 65 pulgadas se distribuye entre los doce meses del año. Se necesitan tres desyerbes o 18 hombre-días por acre. En la región de Zululand, la lluvia anual de 40 pulgadas se concentra en los meses de noviembre a febrero inclusive, y pueden necesitarse hasta cinco desyerbes, que requieren de 20 a 30 hombre-días. En la región de Port Shepstone, con 40 pulgadas de lluvia concentrada en septiembre y noviembre, se necesitan de tres a cinco desyerbes, equivalentes a de 16 a 20 hombre-días.

Es aquí donde el empleo de herbicidas antes de germinar la cosecha y la maleza resulta ventajoso. Durante largos períodos lluviosos, los desyerbes manuales resultan imprácticos, debido a lo cual la maleza se desarrolla profusamente.

Con el objeto principal de hacer frente a las condiciones resultantes de estas variaciones en humedad, la E. I. duPont de

Figura 3

Figura 4

Nemours Company desarrolló dos herbicidas químicos conocidos como "Telvar" y "Karmex". Ambos son ureas substituidos. La principal diferencia está en sus solubilidades en agua, pero ambos son 80% humectantes. Karmex es solamente como un sexto tan soluble como Telvar, lo que significa que se lixivia lentamente y contiene el desarrollo de maleza más tiempo en regiones de mucha lluvia, mientras que Telvar es más aceptable en casos donde su más baja solubilidad resulta ventajosa. Estos productos le ofrecen al cosechero de caña un medio eficaz de impedir la germinación de maleza, pero no son propios para reprimir severas infestaciones de especies ya establecidas. Son eficaces como elementos residuales preventivos para impedir el brote de hierbas y yerbajos de hoja ancha, y suprimen la propagación de maleza hasta el cierre de la cosecha. Karmex tiene dos ventajas sobre Telvar: mayor margen de seguridad para la mayoría de cosechas y represión residual más prolongada en tierras ligeras y en regiones de mucha lluvia.

La diferencia entre el costo del método de represión químico y el de la fuerza de brazos que reemplaza determina el valor económico del método químico para el productor de caña. Las aspersiones manuales de uno de estos productos químicos pueden requerir de uno a seis hombre-días por acre, más el costo del material. En Hawaii se estima que un hombre con una aspersora de tres boquillas tipo de mochila es capaz de asperjar de cinco a ocho acres de cañaveral por día de ocho horas. Las aspersoras mecánicas tiradas por tractor son capaces de asperjar de 20 a 50 acres diarias, según el terreno, el estado de desarrollo de la cosecha y la humedad del suelo. Se calcula que las aspersiones por avión en Puerto Rico cuestan dos y media veces tanto como las manuales. Pero como éstas se hacen "a la orden", no implican inversión de capital ni costos de operación. Además, las aspersiones por avión a menudo se pueden hacer más uniformemente y en momentos más oportunos.

Al considerar la adopción de un programa de represión de maleza antes de la germinación se deben tomar en cuenta las tendencias en cuanto a la disponibilidad de brazos y escalas de jornales, la diversificación económica de la región y otras tendencias tecnológicas en la producción de azúcar. La escasez de brazos, los niveles ascendentes de los jornales, la creación de nuevas oportunidades de empleo para los trabajadores agrícolas, y la adopción de métodos mecánicos de siembra y recolección todos pueden acelerar la necesidad de métodos de represión de maleza que impliquen menos trabajo manual.

En algunas regiones, la represión preventiva (previo a la germinación) con el matamalezas monurónico "Telvar" o el diurónico "Karmex" se está aceptando rápidamente como una práctica comercial. En otras partes, los cosecheros con miras hacia el futuro se están familiarizando con esta práctica, por lo menos en vía de prueba. Toda nueva práctica agronómica tiene que ser adaptada a las condiciones locales del suelo y del clima. Será necesario

(Sigue en la página 70)

Figura 5

Figura 6

Chalanas de acero en Old Harbour amarradas al costado de un buque de carga, donde el azúcar es descargado por arpeos operados por el aparejo del buque que lo vacían directamente en la bodega del buque.

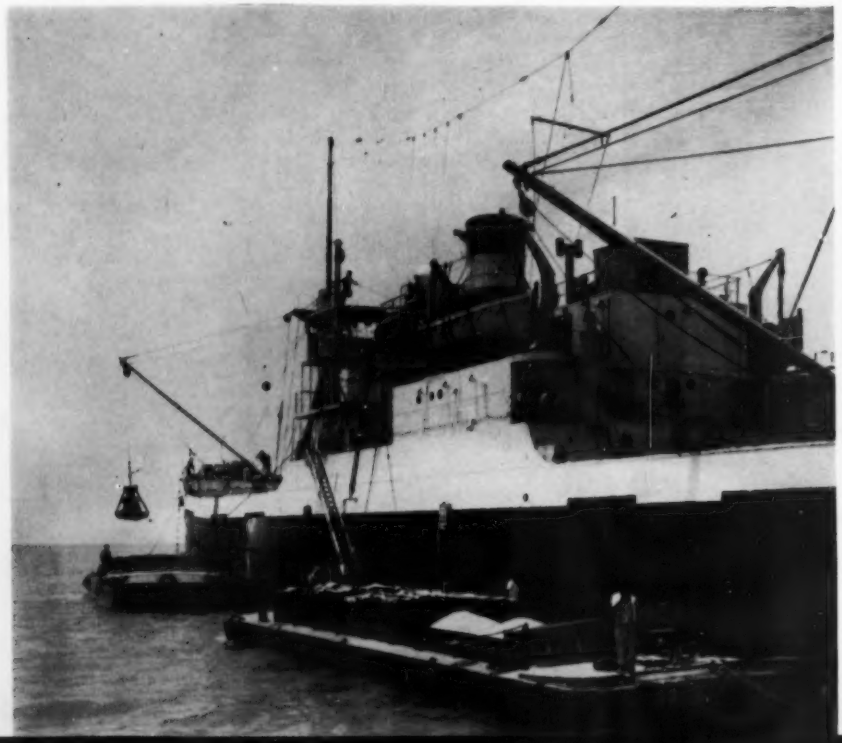
Manejo a Granel en Monymusk

Prevención de la Corrosión Bajo Condiciones Adversas

En 1956, la División de Monymusk de la West Indies Sugar Company Ltd., instaló el equipo necesario para el embarque de azúcar crudo a granel de Jamaica. Como se trata de una subsidiaria de Tate & Lyle, este paso fue dictado por la necesidad de la refinería inglesa de recibir el azúcar crudo a granel y por el creciente costo del sistema de embarque en sacos. La instalación es extraordinaria en varios sentidos. El azúcar tiene que ser embarcado desde el central hasta el muelle a 10 millas de distancia, donde era anteriormente transbordado a chalanas que lo portaban a lo largo del Río Salado (Salt River) hasta la Vieja Bahía (Old Harbour), donde era cargado en buques.

Para cambiar esta práctica al sistema de manejo a granel fue necesario construir en el muelle un almacén de 20,000 toneladas de capacidad y adquirir una flota de camiones de volquete para transportar el azúcar crudo hasta el muelle. Cada camión carga cinco toneladas. Estos mismos camiones se emplean para acarrear el azúcar crudo del muelle y entregarlo a las chalanas (véase la ilustración inserta).

En el almacén de 20,000 toneladas de capacidad próximo al muelle (a 10 millas de Monymusk), el azúcar crudo es transbordado a chalanas de acero de construcción especial.



Las chalanas de acero presentaron problemas especiales. Son de construcción soldada a fin de eliminar las riostras y travesaños en su interior que pudiesen entorpecer el empleo de arpeos en la operación de descarga. Estas embarcaciones trabajan en condiciones sumamente corrosivas, pues aunque el Río Salado consta de agua dulce en su parte alta, es moderadamente salobre más abajo y positivamente salado en la bahía donde cargan los buques. Es decir que la propensión ordinaria a la corrosión en agua salada es aumentada al pasar de agua dulce a agua salada y viceversa.

Con el objeto de remediar esta dificultad, los ingenieros de Monymusk colaboraron con representantes industriales de la Esso Standard Oil, C. A. en la evolución de una capa protectora para las diez chalanas de acero contra las condiciones adversas creadas por la combinación de agua dulce y salada. Se aplicaron dos manos de Esso's Rust-Ban 270 seguidas de una mano final de Esso's Rust-Ban 297 a las diez chalanas (con una superficie exterior de 8,000 pies cuadrados cada una). A la fecha, no se ha observado corrosión alguna en los casos de las chalanas, lo que atestigua el valor del estudio previo a la aplicación de estas capas protectoras.

Texto e ilustraciones cortesía de ESSO OILWAYS, Tomo IX, Número 5.

otra primera por

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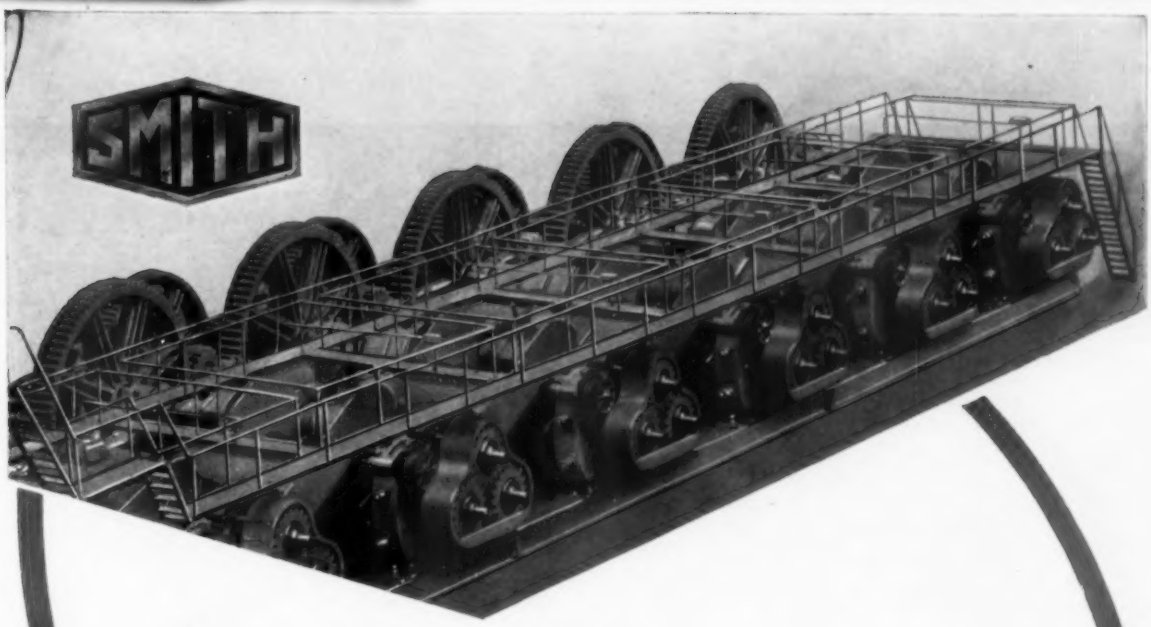

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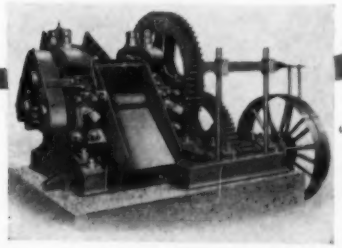

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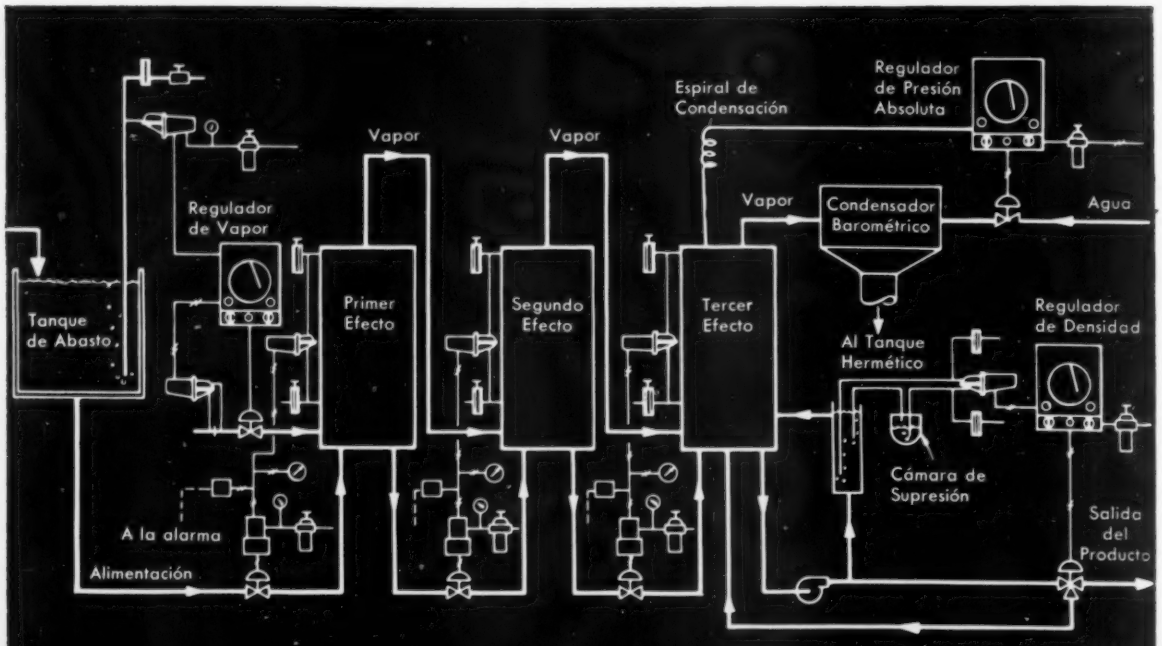

Sistema de regulación básico para evaporadores de múltiple efecto. El ascenso de nivel en el tanque de abastecimiento aumenta el flujo de vapor y produce un aumento en el régimen de evaporacion. El nivel en cada vaso se mantiene por un regulador *Tel-O-Set.* La presión absoluta en el último vaso se ajusta por la regulación del flujo de agua de condensado al condensador. La densidad final de la solución de azucar es ajustada por el regulador de recirculación.

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Los reguladores Honeywell exactos y seguros producen importantes economías en cada fase del proceso de refinación. En la regulación de evaporadores de múltiple efecto, reducen el consumo de vapor, aumentan la capacidad de evaporación, reducen los arrastres, y reducen al mínimo los paros para limpiar los tubos.

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Para datos completos sobre instrumentos para evaporadores de múltiple efecto o reguladores para cualquier fase del proceso de elaboración de azúcar, comuníquese con el ingeniero regional de la Honeywell más cercano hoy mismo.

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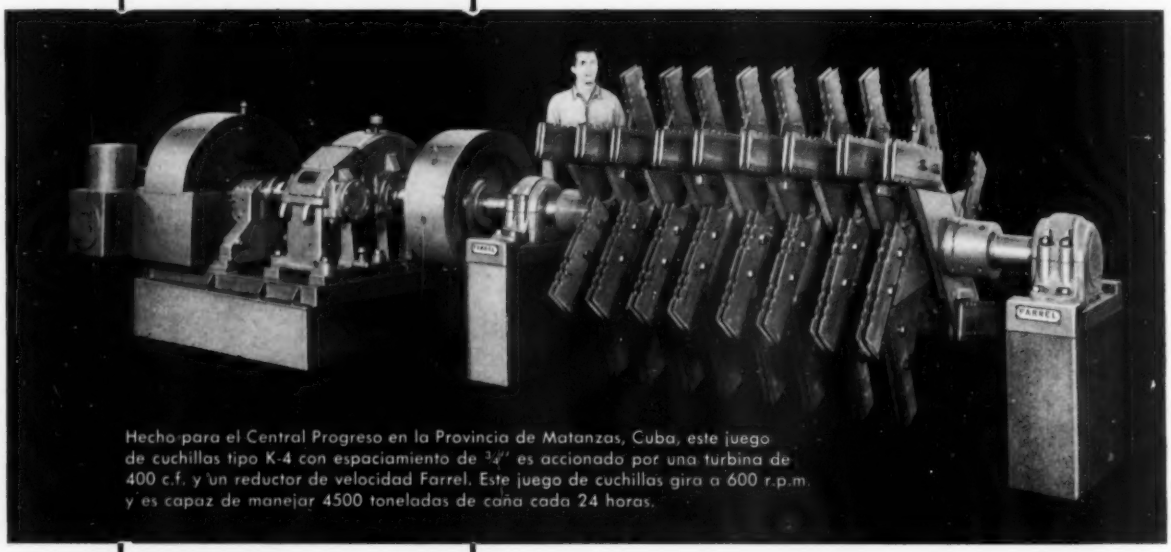
CUCHILLAS DE CAÑA FARREL GIRATORIAS

alta eficiencia con economía en la preparacion de caña



Hecho para el Central Progreso en la Provincia de Matanzas, Cuba, este juego de cuchillas tipo K-4 con espaciamiento de ¾" es accionado por una turbina de 400 c.f. y un reductor de velocidad Farrel. Este juego de cuchillas gira a 600 r.p.m. y es capaz de manejar 4500 toneladas de caña cada 24 horas.

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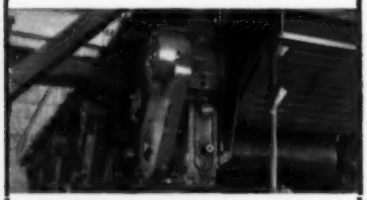

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Varias fábricas de azúcar han instalado recientemente juegos de cuchillas tipo K-4, usando espaciamiento de 1½ a 2" para el primer juego, con las puntas de las cuchillas a unas 4" del transportador de caña, y espaciamiento de ¾" para el segundo juego, con las puntas de las cuchillas tan próximas al transportador como es prácticamente posible. La disposición más próxima de las cuchillas en el segundo juego resulta en un trabajo comparable al de una desfibradora, con menos costos de conservación y consumo de energía.

El Boletín 312 de 40 páginas contiene datos completos acerca de las cuchillas de caña giratorias y demás equipo ilustrado. Solicite un ejemplar hoy mismo.

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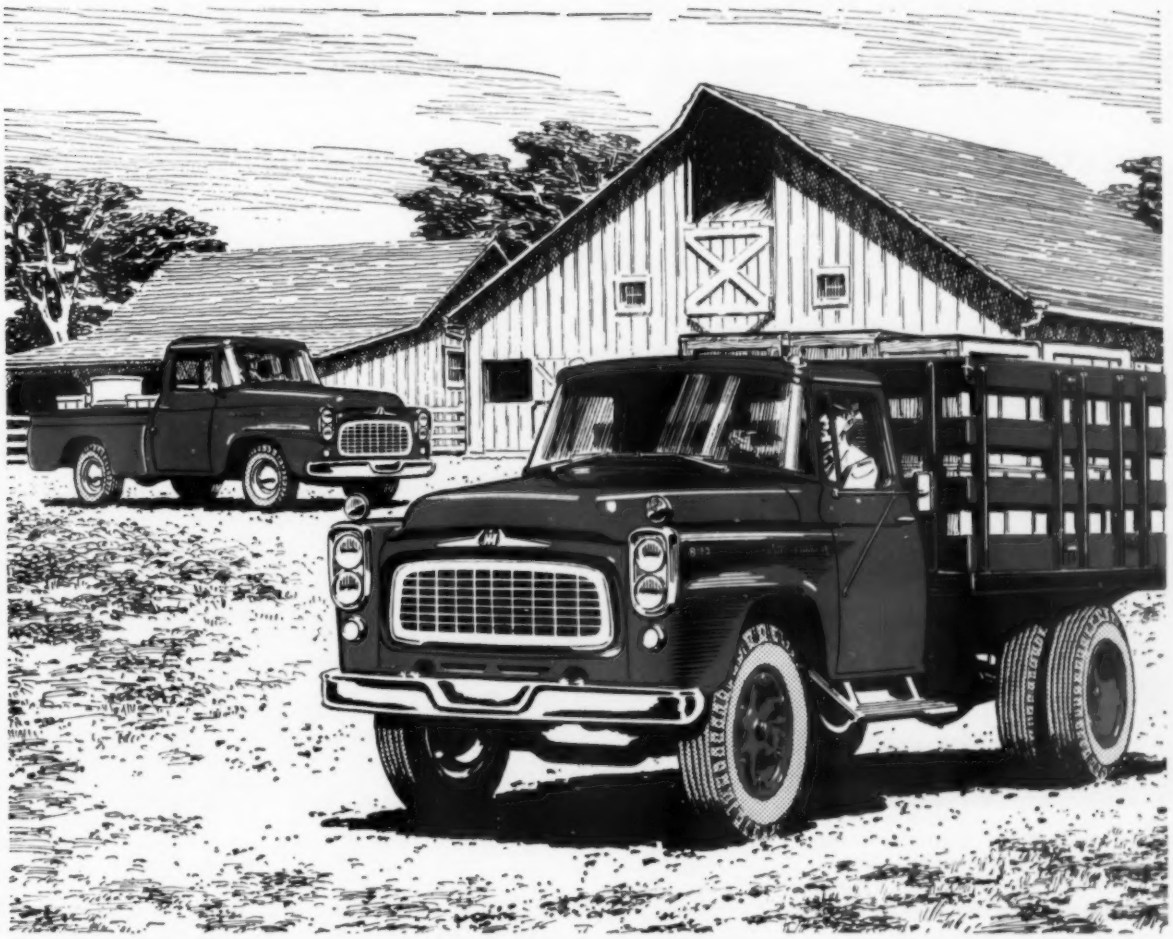

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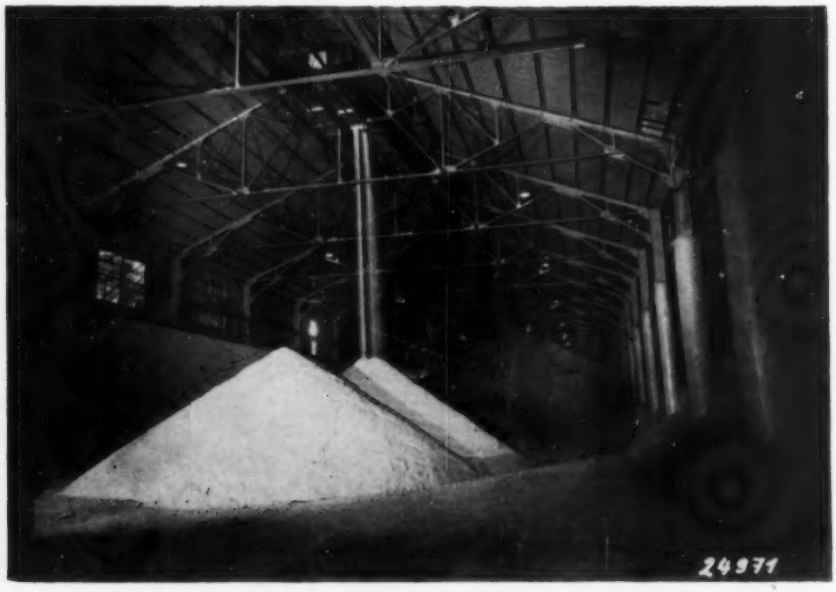
Manejo de Azúcar a Granel en la República Dominicana

Nueva Instalación en Servicio en el Central Río Haina



Dentro de uno de los cuatro almacenes puede verse una corriente continua de azúcar descendiendo del transportador Buhler de cadena suspendido de las vigas del techo.

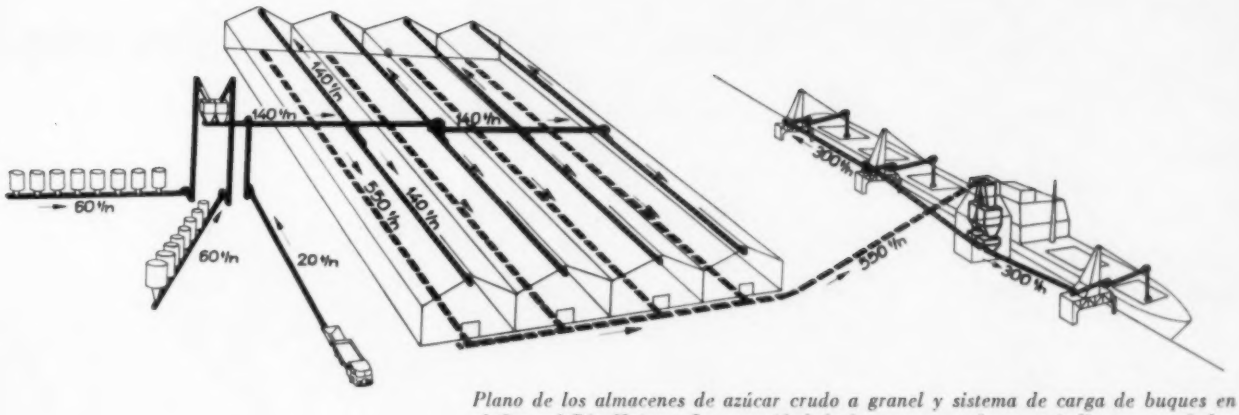
El Central Río Haina en la República Dominicana, uno de los más grandes del mundo, con una producción anual de unas 200,000 toneladas, viene operando un sistema de manejo y/o embarque a grandel desde principios de 1959. Este central hace varios años que viene prosiguiendo un extenso programa de modernización. La reciente instalación de una batería de centrífugas automáticas abrió paso a la construcción de un extenso sistema de almacenamiento y carga de azúcar a granel. El equipo fue diseñado e instalado por Buhler Brothers de Suiza en colaboración con ingenieros de la Azucarera Haina, C. por A. y personal del Central Río Haina. La Azucarera Haina posee y opera varios otros centrales en la República Dominicana, lo que explica uno de los detalles singulares del sistema de manejo a granel.

Refiriéndonos al diagrama inserto, dos transportadores Buhler tipo de cadena traen el azúcar de cada fila de centrífuga a dos elevadores de cubo con una capacidad de 60 toneladas por hora. Seguidamente, el azúcar de cada línea de producción es pesado automáticamente. Dos transportadores en serie sobre el tejado del almacén distribuyen el azúcar crudo dentro del edificio. Cada almacén tiene 130 metros de largo. El azúcar es distribuido dentro de cada almacén por transportadores que corren desde el centro, uno hacia la izquierda y el otro hacia la derecha, y ambos suspendidos del techo.

A fin de que otros centrales más pequeños de la misma empresa puedan utilizar el nuevo sistema de carga moderno, se instaló un volcador de camiones independiente que permite entregar el azúcar al nuevo sistema de conducción. El azúcar se pesa en una báscula tipo de camión.

Para retirar el azúcar de cada uno de los cuatro almacenes, con una capacidad conjunta de 87,000 toneladas, se instaló un transportador de banda en el centro del piso de cada almacén. Las bandas están cubiertas con perfiles de aliminio removibles. Al remover una de estas cubiertas, al azúcar fluye automáticamente a la banda. El azúcar restante es alimentado a los transportadores de banda mediante *payloaders*. Un transportador de cadena de construcción especial impide la sobrecarga

El arrumador instalado en el extremo inferior del conducto telescópico distribuye el azúcar dentro de la bodega del buque a razón de 300 toneladas por hora.



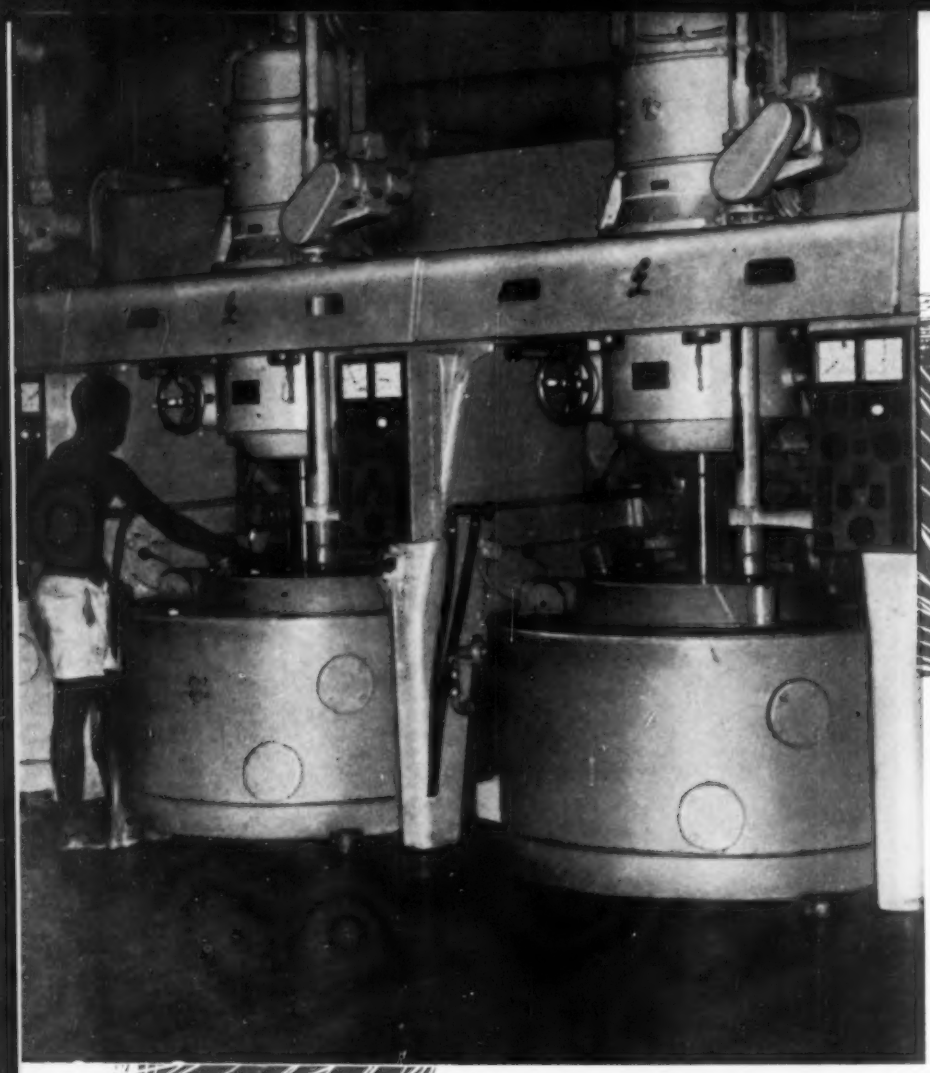
Plano de los almacenes de azúcar crudo a granel y sistema de carga de buques en el Central Río Haina. La capacidad de los transportadores se indica en toneladas. Los transportadores de cadena se indican con líneas sólidas y los transportadores de banda con líneas truncadas. El sistema fue instalado por Buhler Brothers. La capacidad de los cuatro almacenes es de 87,000 toneladas.

El vapor "Crystal Jewel" cargando azúcar a granel a razón de 10,000 toneladas en 20 horas en el Central Río Haina.

de las bandas de extracción y asegura una capacidad máxima constante de 550 toneladas por hora. Otro transportador de banda instalado en ángulo recto fuera del almacén entrega el azúcar a la torre de pesar en el muelle de embarque. En esta torre, dos básculas de azúcar tipo de volquete de construcción especial aseguran una exactitud de uno por ciento. De la torre de pesar, el azúcar fluye en dos corrientes paralelas a tres torres de carga. Estas torres están construidas de tal forma que sólo dos de ellas son capaces de transbordar las 550 toneladas por hora a las bodegas del buque. La distancia entre estas torres implicó un estudio especial, ya que era necesario poder cargar buques de diversos tipos sin cambiar posición. El brazo oscilante que se extiende sobre la cubierta del buque incluye otro transportador Buhler tipo de cadena completamente encerrado a fin de impedir el derrame de azúcar. Este brazo de carga oscila en un arco de 180°, y se puede alzar o bajar. A la salida del transportador de carga del buque, un conducto telescópico vertical lleva el azúcar a un arrumador instalado en el extremo inferior del conducto telescópico. Cada arrumador puede manejar hasta 300 toneladas por hora y lanza el azúcar a una distancia de 30 metros, lo que permite cargar todos los rincones de las bodegas del buque. Toda la operación de carga se realiza por telemando desde un tablero de instrumentos en cada torre de carga. Esta

(Sigue en la página 70)

Las tres torres de carga, cualquiera dos de las cuales pueden cargar 550 toneladas de azúcar por hora. El tablero principal de mando se encuentra en la torre de pesar al centro, derecha.



Parte de una batería de centrífugas completamente automáticas en la Sucrerie de Congo-Belge, Congo Belga.

En fábricas y refinerías de azúcar de remolacha y de caña siempre se observa la tendencia hacia la modificación del proceso de elaboración a fin de obtener cada vez mayor continuidad. Para llevar aún más lejos este principio, la ASEA-Landsverk presenta—

La Centrífuga Completamente Automática

con Transmisión Leonard

Esta centrífuga presenta las mismas ventajas que la máquina de marcha continua y velocidad constante, en lo que se refiere al bajo consumo de energía y al bajo costo de conservación.

SUS PRINCIPALES CARACTÉRISTICAS SON:

Diseño Aerodinámico

Velocidades Variables, Máxima y de Carga

Frenaje Regenerativo Completamente Eléctrico

No Ocurren Picos de Carga

Mecanismo de Carga Neumáticamente Accionado

Descargador Accionado por Motor

Sincronización Automática Centralizada

Propia para Azúcar de Todas Clases

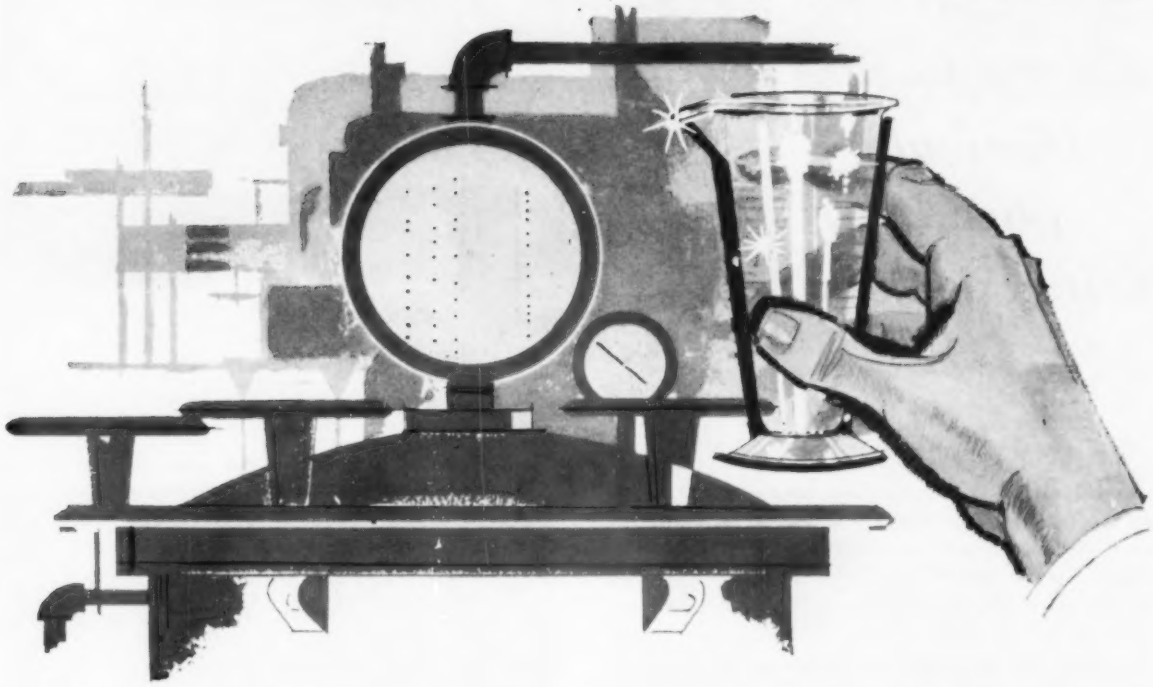
Contamos con representantes y facilidades de servicio en todos los países productores de azúcar.

Para mayor información diríjanse a la oficina de la ASEA más cercana, o directamente a:

ASEA

Västerås, Suecia

¡Nuevas Normas de Regulación de la Filtración



hechas posibles por los auxiliares filtrantes **EAGLE-PICHER!**

He aquí la razón:
Las extensas operaciones de la Eagle-Picher en Nevada han hecho nuevamente disponibles *varios millones* de toneladas de diatomita para auxiliares filtrantes de excelente calidad.

Los grados del material son exactamente determinados en la mina mediante "Pruebas Estratigráficas", lo que asegura extraordinaria pureza desde el principio.

La Eagle-Picher produce una extensa gama de grados de auxiliar filtrante en la fábrica de productos de diatomita más nueva y más eficiente del mundo.

Con esta notable "uniformidad de grados", usted puede regular la claridad con exactitud dentro de un régimen de flujo también regulado.

Los auxiliares filtrantes Eagle-Picher vienen esterilizados, son química y físicamente inertes, y no pueden alterar el sabor ni impartirlo.

Usted obtiene perfecta filtración que elimina todos los termófilos y sólidos indeseables dentro de los límites coloidal y submicroscópico.

La pureza sin par de los auxiliares filtrantes Eagle-Picher redunda en menor densidad húmeda y permite cubrir mayor extensión superficial. Los consumidores anuncian importantes economías fabriles.

Muestras para Pruebas y Servicio de Consultas a su disposición. Comuníquese con nosotros cuando quiera, por escrito, telégrafo o teléfono.

EAGLE EP PICHER

Desde 1843

EAGLE-PICHER

The Eagle-Picher Company
Oficinas Generales:
Cincinnati 1, Ohio, E.U.A.

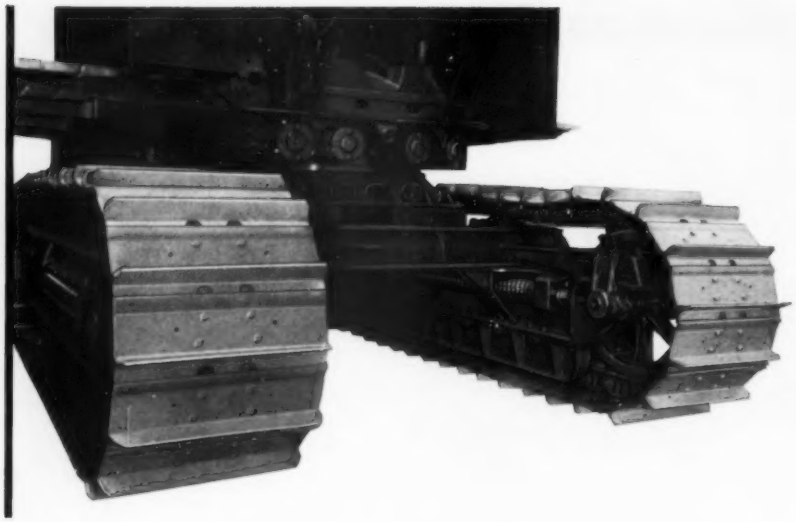
Para datos técnicos y muestras, envíenos el cupón inserto
The Eagle-Picher Co., Depto. SYA-9, Cincinnati 1, Ohio, E.U.A.

☐ Sírvasenos enviar más información
☐ Sírvanse enviar muestra _____ cantidad
Tipo de producto a filtrar _____

Auxiliar Filtrante a usar para:
☐ Filtración primaria ☐ Precapa
☐ Alta claridad o acabado ☐ Mezcla

NOMBRE _____ CARGO _____
EMPRESA _____
DIRECCION _____ CIUDAD _____
ESTADO O PROV. _____ PAIS _____

22-B Especialmente Diseñada para la Carga de Caña



CARRILES ESPECIALES construídos para tener más espacio libre debajo de la máquina; zapatas con garras profundas para tracción segura sobre terrenos resbalosos; guardarrodillos especiales de largo completo para conservar limpios los rodillos de los carriles. *Cada uno de estos detalles de construcción es equipo de norma . . . que eleva el rendimiento en el cañaveral.*

LUBRICACION AUTOMATICA positiva de los engranajes principales (menos el engranaje y piñón de viraje que son lubricados por sistema remoto) porque están encerrados en una caja y funcionan en un baño de aceite. La máquina no solo funciona mejor, *sino que trabaja más horas porque se pierden menos horas en servicio.*

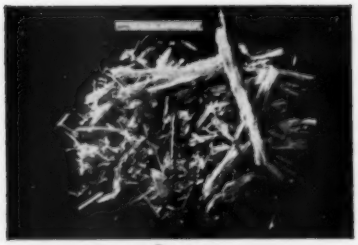
ENTRECIERRE ESPECIAL que ofrece óptima seguridad, especialmente en pendientes, porque uno de los dos embragues de dirección siempre está embragado.

RODILLOS DE GARRAS CONICAS que eliminan el macho central. La carga se distribuye por gran parte del recorrido de los rodillos en todo caso, indistintamente de las condiciones del terreno.

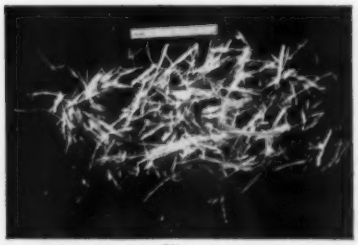
Las Cargadoras de Caña BUCYRUS-ERIE 22-B le prestan el servicio que usted necesita porque *están* diseñadas para trabajar en cañaverales. Solicite datos completos del distribuidor de la Bucyrus-Erie en su localidad, o escriba al Depto. 65E, Bucyrus-Erie Company, División Internacional, South Milwaukee, Wisconsin, E.U.A.

BUCYRUS ERIE®

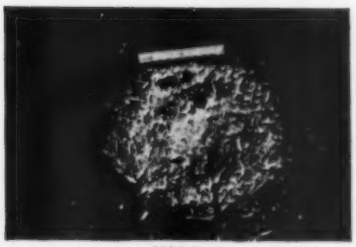
Construye Mejor Equipo



Bagazo

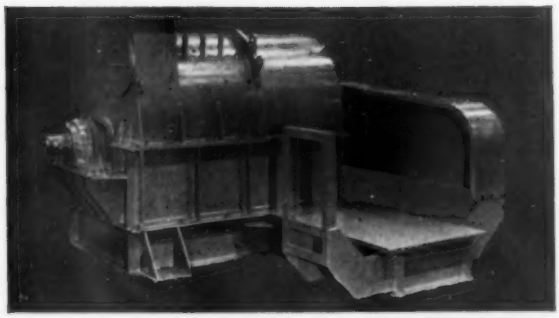


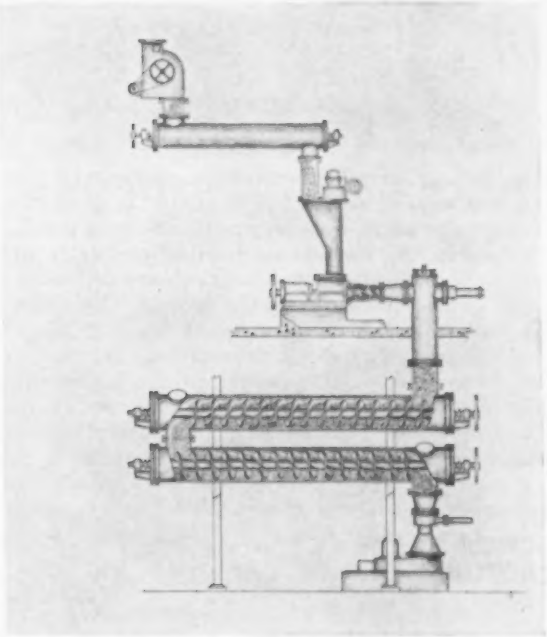
Fibra



Médula

Nueva pareja que permitirá la producción de pulpa de bagazo de alta calidad a un costo más bajo





El Desmedulador "Horkel"

El Desmedulador "Horkel", ideado por la Universidad de Louisiana y distribuido exclusivamente por Parsons & Whittemore, ofrece una segura solución económica a un problema que ha puesto límites al valor del bagazo como materia prima para la producción de papel.

Al hacer posible la separación de gran parte de la médula e impurezas en la central azucarera, el Desmedulador "Horkel" permite la producción de fibras limpias aumentando en esta forma la capacidad en el digestor hasta en un 20%. La desmedulación reduce el embalaje, los gastos de manejo, proporciona economías en los productos químicos requeridos para la cocción y blanqueo (generalmente consumidos por la médula) y disminuye los problemas de mantenimiento en la fábrica de papel.

El Digestor Continuo "Pandia"

(Chemi-Pulper)

El Digestor Continuo "Pandia" (Chemi-Pulper) ofrece todas las ventajas de una rápida operación y un estrecho control de la calidad, en un sistema de producción continuo que permite la elaboración de pulpa de bagazo (o de cualquier otro material celuloso) de alta calidad.

El alimentador compactador y el alimentador sinfín que esta unidad posee solucionan el problema relacionado con el natural volumen del bagazo, permitiendo una mayor cantidad de material por pié cúbico de capacidad en el digestor.

El uso de alta presión y temperatura permite la producción de pulpas blanqueadas o completamente blanqueables y de gran resistencia, en 10 minutos o menos. El consumo de vapor, labor y productos químicos es bajo.

Para informes sobre el Desmedulador "Horkel", el Digestor Continuo "Pandia" (Chemi-Pulper), o cualquier otra maquinaria para fabricar pulpa y papel, sírvase escribir a nuestra oficina más cercana.

THE PARSONS & WHITTEMORE / LYDDON ORGANIZATION

Primeros en el mundo en el desarrollo de fábricas de pulpa para utilizar las fibras existentes en cada país.

18-19 Savile Row, London W. 1, England

5 Rue Jean Mermoz, Paris 8°, France

250 Park Avenue, New York 17, N. Y.

Equipo Adecuado para el Cultivo de Caña de Azúcar

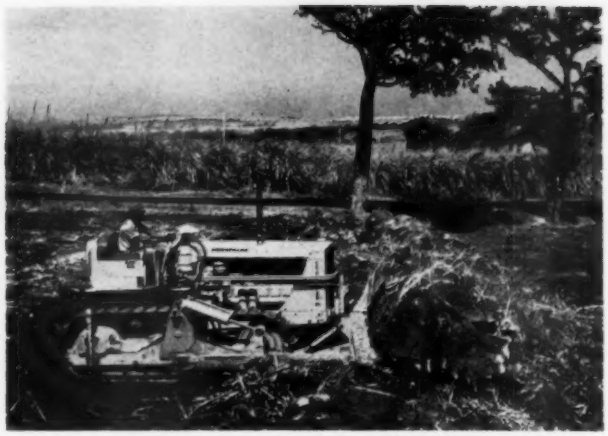
Los productos Caterpillar tienen numerosos usos en plantaciones de caña de azúcar. Los Tractores Cat de carriles, con su gran potencia, tracción y resistencia para trabajar eficientemente bajo condiciones difíciles, son ideales para satisfacer las necesidades de los agricultores dedicados a sembrar caña. Por otra parte, los Motores Cat, con su seguridad y economía insuperables, son los preferidos en las plantaciones para trabajos de irrigación, abastecimiento de electricidad, y para accionar grúas o locomotoras. Igualmente populares son las Motoniveladoras Cat para la construcción de caminos, zanjas, canales y terrazas.

En estas fotografías mostramos unas cuantas de las numerosas maneras cómo el equipo marca Caterpillar puede hacerle una labor verdaderamente digna de elogio.

HECHOS SOBRE LOS TRACTORES CAT DE CARRILES

Tamaño	Potencia en el Volante HP	Máxima fuerza propulsora* (Kgs.)	(Lbs.)
D4	63	4.855	10,700
D6	93	8.620	19,000
D7	140	15.080	33,250
D8	235	24.110	53,150
D9	320	28.575	63,000

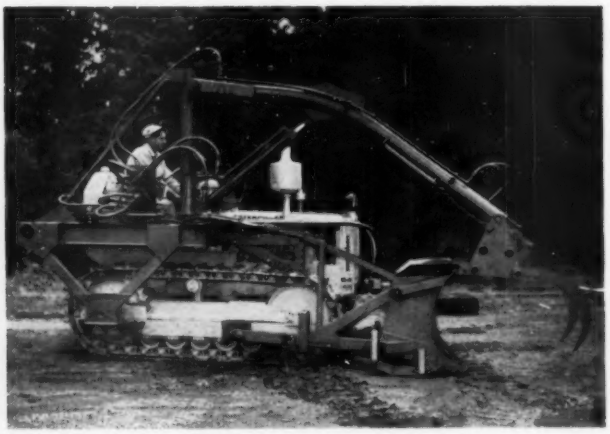
*Transmisión mecánica. Tractores D8 y D9 también disponibles con convertidor de torsión.



Tractor Cat D6 equipado con Barra Portaherramientas No. 6 y Rastrillo Fleco, despeja un campo destinado para la siembra de caña de azúcar.

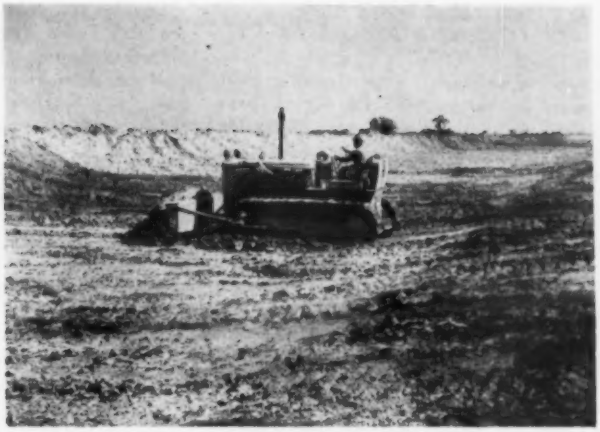
Tractor D4 equipado con Barra Portaherramientas No. 4 y Subsoladoras Fleco con rejas rotativas. También hay disponibles otros implementos especializados.

Tractor D7 y Rasta Descentrada Rome TRCH 10-36 para plantaciones de caña de azúcar. También hay disponible una amplia selección de otras Rastas Rome.

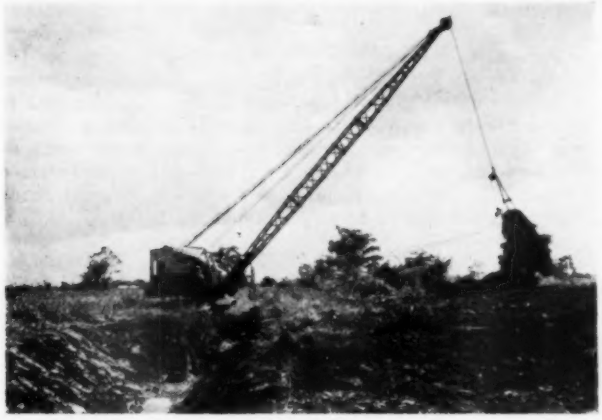


El Tractor D4 equipado con un Cargador de Caña J & L representa una combinación ideal para trabajo rápido. Hay disponible un accesorio para limpiar zanjas.

Barras Portaherramientas Rome para Tractores D8, D7 y D6. Pueden equiparse con subsoladoras, cinceles y otros implementos agrícolas.



El Tractor D6 con Bulldozer Cat es ideal para mejorar tierras. También hay disponibles Traíllas Cat.



Motor Diesel Cat acciona una draga para cavar una zanja de drenaje. Hay disponibles motores hasta de 650 HP.

El Tractor D4 equipado con Azadón Hyster excava y corta zanjas en forma rápida en cualquier clase de terreno.

La Motoniveladora Cat mantiene bien preservados los caminos de transporte y además puede abrir zanjas y formar tierras. Hay tres tamaños disponibles desde 75 hasta 150 HP.

Para que una plantación de caña de azúcar sea rica, debe usarse la máquina adecuada para cada trabajo. El Distribuidor Caterpillar más cercano le ayudará a seleccionar la máquina o máquinas que le rendirán más por su dinero. ¡Solicítele hoy mismo detalles completos!

CATERPILLAR

Cat Caterpillar y Cat son Marcas Registradas de Caterpillar Tractor Co.

PARA SU
PLANTACION
DE CAÑA DE AZUCAR

Caterpillar Tractor Co., Peoria, Illinois, E.U.A. • Caterpillar Americas Co., Peoria, Illinois, E.U.A. • Caterpillar Overseas C.A., Caracas, Venezuela • Caterpillar of Australia Pty. Ltd., Melbourne • Caterpillar Brasil, S.A., São Paulo • Caterpillar Tractor Co. Ltd., Glasgow, Escocia
Caterpillar of Canada Ltd., Toronto, Ontario

Herbicidas

(Viene de la página 53)

entrenar operadores y supervisores y crear fuentes de suministro. El equipo para realizar el trabajo debe hacerse disponible en la época del año más propicia y en perfectas condiciones funcionales.

Todos estos factores deben ser estudiados antes de adoptar comercialmente el método de represión de maleza antes de la germinación. En la selección de locales para las pruebas, conviene escoger campos con un historial de altos costos de desyerbe de maleza nacida de semilla. Las ventajas del método de represión química se harán más evidentes en las estaciones lluviosas que en las de sequía. "Telvar" y "Karmex" acusan los mejores resultados, tanto en lo económico como en lo funcional, cuando se emplean en la epoca más lluviosa del año y en campos con un historial de altos costos de represión de maleza, y donde el principal problema es la maleza nacida de semilla, especialmente yerbajos, durante la época del año cuando la fuerza de brazos escasea más.

Estos herbicidas se mezclan con agua y se aplican al suelo antes de que germinen los yerbajos. La tierra se prepara como de costumbre, con arado y rastrillo; luego se abren los surcos, se siembran y cubren los trozos de semilla, y se pasa un rodillo para comprimer la tierra que cubre la semilla. La Figura 1 muestra el terreno listo para recibir la aspersión previo a la germinación.

Es preferible aplicar las aspersiones a todo el ancho de los camellones, pero para economizar herbicida, algunos cosecheros lo aplican al camellón de caña solamente, dejando un espacio de dos o tres pies sin tratar entre camellones. Esto implica el cultivo de los centros con tractor hasta que cierre la cosecha de caña, lo que puede hacerse difícil en tiempo lluvioso. El campo ilustrado en la Figura 2 se encontraba prácticamente libre de maleza al cabo de un mes después de la siembra. La maleza en los centros fue destruida con una cultivadora. La Figura 3 muestra los camellones limpios después de asperjarlos con "Telvar" y 2,4-D; los espacios entre camellones fueron cultivados con un arado de discos, teniendo cuidado de no echar tierra sobre la faja tratada. La Figura 4 muestra la principal desventaja de los tratamientos por fajas en contraste con las aplicaciones generales en tiempo lluvioso. Las aplicaciones de "Telvar" a los camellones de caña dieron excelentes resultados, mientras que los espacios entre camellones se encontraban completamente poblados de yerbajos. La caña de planta debe ser tratada cuanto antes después de cubrir la semilla. En el caso de caña de soca o de retoño, las aplicaciones deben hacerse al suelo descubierto tan pronto como se termine de preparar el campo para la nueva cosecha de retoño después de recoger la cosecha anterior.

En Hawaii, cada plantación emplea el producto Telvar de acuerdo con su propio programa de represión de maleza, pero el programa básico es similar para todas las islas, y consta de dos arpesiones para cubrir todo el suelo con una capa uniforme de Telvar y luego destruir mecánicamente todos los yerbajos establecidos antes de que la aspersión de Telvar sea activada por la lluvia o agua de riego. La primera aspersión después de la siembra es a razón de cuatro a cinco libras de Telvar por acre. La segunda aspersión, aplicada antes de que los nuevos brotes de caña salgan del trozo de semilla, consta de un herbicida de contacto como aceite aromático.

La diferencia entre Telvar y 2,4-D empleados como herbicidas antes de la germinación en cañaverales en tiempo lluvioso se ilustra por dos campos adyacentes en Puerto Rico. Uno de estos campos (Figura 5) recibió una aplicación total de Telvar antes de la germinación; el otro (Figura 6) fue tratado con 2,4-D. Ambos campos fueron sembrados al mismo tiempo y recibieron más de 25 pulgadas de lluvia. Tres meses más tarde y en estas condiciones húmedas, el campo tratado con Telvar se encontraba libre de maleza; el campo tratado con 2,4-D necesitó una pasada de azada para poderlo abonar debidamente antes del cierre de la cosecha. Esta limpieza a mano costó $10, lo que elevó el costo total de represión de maleza en este campo a $24, comparado con el costo de unos $12 para el otro campo.

La humedad producida por agua de riego o por la lluvia se hace necesaria para que estos herbicidas se introduzcan en la capa superficial del suelo (como una pulgada). Cuanto mejor se prepara el suelo, mejores serán los resultados, siempre que el suelo tratado no sea perturbado después de la aplicación. La cantidad que se necesita varía según el tipo de equipo empleado, el terreno y el método de cultivo. Las siguientes cantidades son aproximadas:

Bombas de mochila, 20-50 gal./acre.

Aspersoras mecánicas, 15-40 gal. (generalmente de 25 a 30 gal.).

Aspersiones por avión, no menos de 6 gal./acre.

Se prefieren las boquillas que arrojan un chorro plano en forma de abanico. Una descarga forzada de gotas gruesas es mejor que la descarga de neblina fina por boquillas en forma de cono.

■

Río Haina

(Viene de la página 63)

operación también puede ser regulada desde un tablero centralmente emplazado en la torre de pesar. Entre los diversos centros de operaciones se emplea un sistema de intercomunicación.

Este sistema viene funcionando satisfactoriamente desde su instalación, cargando buques de 10,000 toneladas en 20 horas, comparado con los cinco a ochos días que se necesiban anteriormente para cargar la misma cantidad de azúcar en sacos.

■

Denuncia Centra la British Columbia Refining Company

Una denuncia acusando a la British Columbia Sugar Refining Company Ltd. y a la B. C. Sugar Refinery Ltd. de haber formado un monopolio en las cuatro provincias occidentales del Canadá fue presentada a la División del Tribunal Supremo Inglés (Court of Queens' Bench) en Winnipeg. La denuncia alega que la B. C. Sugar Refinery Ltd. acquirió el dominio de las operaciones de la Manitoba Sugar Company Ltd., formando una fusión o monopolio que viene operando o puede llegar a operar en detrimento del público. La denuncia también alega que la Canadian Sugar Factories Ltd., la Manitoba Sugar Ltd., La B. C. Sugar Refining Company (de Alberta), y la B. C. Sugar Refining Company (de Saskatchewan), que dominan la industria azucarera en las cuatro provincias occidentales, están operando en contra de los intereses públicos. El caso será tratado en la próxima sesión del Tribunal citado en octubre de 1959.

■

Propuestas Azucareras al Mercado Común Europeo

Refiriéndose nuevamente al efecto del Mercado Común Europeo en el comercio mundial azucarero descrito por Peter Runge, vice-presidente de Tate & Lyle en el almuerzo del Club Azucarero de Nueva York (*Sugar y Azúcar*, Abril de 1959, página 51), recientemente se anunciaron dos interesantes propuestas. Herr Lueckner, miembro del cuerpo legislativo de Alemania Occidental, propuso que el Mercado Común Europeo debe establecer una Oficina Azucarera Europea para regular las importaciones de países fuera de este Mercado y para establecer una reserva (pool) para compensar las oscilaciones en suministros dentro del Mercado. El Sr. Lueckner también recomienda una reducción de impuestos gradual dentro del Mercado Común para aumentar el consumo. Poco después de estas recomendaciones, la West German Sugar Association (Asociación Azucarera de Alemania Occidental) propuso al Mercado Común un derecho aduanal de 3.25% sobre azúcar importado de países fuera del Mercado Común y el establecimiento de una Agencia de Importación para fijar derechos preferenciales sobre azúcar tratado y/ vendido en el Mercado Común.

Obtenga mayor producción y menos costos de operación con una locomotora diesel-eléctrica G. E. Modelo U6B

He aquí la locomotora ideal para aplicaciones generales que requieran un peso liviano por eje, y una operación económica – la Modelo U6B de 700 hp de la mundialmente famosa línea universal de locomotoras diesel-eléctricas G. E.

La U6B es una locomotora confiable de bajo costo que puede utilizarse para el acarreo de caña de azúcar (o betarraga) de los puntos de recolección a los trapiches. Puede también utilizarse para las maniobras de cambio de vagones cargados de azúcar, melazas, gabazo, y para su rápido transporte a las refinerías, fábricas o plantas de pulpa papelera. Por su gran versatilidad, además, la U6B es utilizable tanto para operaciones de ramales como de línea principal (en vías de 914 mm a 1676 mm) que requieran fuerza locomotriz económica.

Otras importantes características del Modelo U6B son su excepcional disponibilidad – a menudo hasta 98% – y el bajo costo del combustible requerido. Por otra parte, el uso de piezas normalizadas intercambiables resulta en una mayor sencillez de mantenimiento, inventarios más reducidos, menores costos de piezas. Su simple diseño provee fácil acceso a todas las partes componentes – reduce el tiempo y costos de mantenimiento.

El representante de la International General Electric Company más cercano a su localidad gustosamente le demostrará cómo la U6B – y otras locomotoras diesel-eléctricas G-E – pueden mejorar la eficiencia de sus operaciones ferroviarias. Solicite el boletín GEA-6868.

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Extensas Mejoras en Mauricio

En 1958, la Flacq United Estates Ltd. produjo 59,916 toneladas de azúcar en las Islas de Mauricio de un total de 463,401 toneladas de caña equivalentes a 3.9 toneladas de azúcar por acre. El beneficio bruto, después de descontar $215,000 por cuenta de depreciación, fue $1,263,838; el beneficio neto fue $946,299. Se declaró un dividendo de 10%. La empresa está llevando a cabo un extenso proyecto de viviendas para sus empleados. Al terminar la campaña, la empresa adquirió una cantidad considerable de nuevo equipo, lo que representa parte del programa de expansión de su tren de molienda para elevar su capacidad a 240-250 toneladas de caña por hora. La empresa también está experimentando con el sistema de riego aéreo en tierras recientemente dedicadas a cañaveral.

■

Descripción de la Regulación Automática de Tachos al Vacío Ante el Grupo Zerban

El Sr. W. S. Taylor de la Minneapolis Honeywell Company dirigió la palabra a la Zerban Sugarmen's Association durante su reunión y almuerzo en el Club de Químicos de Nueva York el 15 de julio. Para obtener los mejores resultados de tachos al vacío completamente automáticos es necesario medir, regular y mantener lo más constante posible las variantes designadas vacío, vapor, nivel, movilidad y sobresaturación, dijo el Sr. Taylor. En el sistema descrito, cada una de estas variantes afecta la secuencia funcional cuando varían las condiciones, en contraste con el sistema basado en el supuesto que el vapor, la alimentación, etc. son constantes, lo que no es cierto en todo caso. Valiéndose de un diagrama de un sistema completo de registro y regulación para tachos al vacío, el Sr. Taylor describió los instrumentos empleados en dicho sistema y sus funciones, cada uno de los cuales depende de la medida de las variantes que pueden afectar su funcionamiento.

■

Francis L. Mottram

El Sr. Francis L. Mottram, presidente de la junta de directores de la Factory Sales and Engineering, Inc., New Orleans, Louisiana, falleció el 22 de julio de 1959 al cabo de una enfermedad de varios meses. El Sr. Mottram permaneció al servicio de la industria azucarera durante toda su carrera profesional iniciada en calidad de técnico azucarero con la Cuban American Sugar Company, Inc. En 1935, el Sr. Mottram organizó la Factory Sales and Engineering, Inc., en la que se mantuvo activo hasta su muerte.

■

John W. McMahon

El Sr. John W. McMahon, superintendente de la antigua National Sugar Refinery, falleció en su casa en Yonkers a la edad de noventa y tres años. El Sr. McMahon dedicó su vida a la industria azucarera, habiendo ingresado en la Refinería de Yonkers en 1893. Antes del Sr. McMahon, su padre ejercía el cargo de catador de azúcar.

■

Aplicación Comercial de la Sucroquímica

Un proceso para la fabricación, a base de azúcar, de agentes tensoactivos que parecen ser propios para diversas aplicaciones industriales, fue patentado por H. B. Hass, Foster D. Snell, William C. York y Lloyd I. Osipow. Los inventores han asignado la patente (No. 2,893,990) a la Sugar Research Foundation, de la que el Dr. Hass es el presidente.

Los productos obtenidos por este proceso son ésters ácidograsos de sacarosa, de color pálido, suaves al paladar y exentos de odor.

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R-P&C abarca un surtido completo de válvulas de compuerta, de globo, angulares y de retención fabricadas en bronce, hierro fundido o forjado en una amplia variedad de tamaños y estilos . . . y para toda clase de presiones. Además R-P&C ofrece productos especiales como válvulas de compuerta Lubrotite, grifos con prensaestopas de asbesto, accesorios de acero fundido y válvulas de acero fundido de cierre sellado a presión. Escriba a la dirección de abajo para más informes. sz

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Una Invitacion

Reunión Anual de Técnicos Azucareros de Puerto Rico

El presidente y comité ejecutivo de la Asociación de Técnicos Azucareros de Puerto Rico formularon una invitación muy cordial a los técnicos azucareros en todo el mundo a que asistan a su próxima reunión anual. La reunión se celebrará en San Juan, Puerto Rico, del 3 al 5 de diciembre, inclusive. Se está preparando un programa de extraordinario interés. Los problemas encontrados en la fabricación y transporte de azúcar crudo y refino en Puerto Rico son tan similares a los encontrados en muchos de los principales países productores de azúcar que los señores Harold A. Willett, presidente; Charles Haeussler, vicepresidente; Miguel Capllonch, tesorero; y Rafael Hilera, secretario de la Asociación, opinan que los visitantes de otras regiones azucareras probablemente encontrarán la próxima reunión de la ATAPR de gran interes práctico. Se presentarán varios trabajos importantes sobre Agronomía, Economía, Ingeniería, Química y Subproductos. La presentación de cada trabajo será seguida de un período de discusión, en la que se solicita la participación de los visitantes. Se están preparando visitas a la Estación Experimental, a las fábricas y a los campos de caña. Según los planes iniciales, la reunión se celebrará en el Hotel Caribe Hilton en San Juan. Aquellos que deseen aceptar la invitación de la Asociación deben comunicarse con el presidente, Harold A. Willett, Central Cortada, Apartado 477, Santa Isabel, Puerto Rico. El Sr. Willett se complacerá en ayudar a hacer los arreglos necesarios para el hospedaje de los visitantes, etc.

■

Maquinaria Azuacarera para Rusia

La Unión Soviética colocó un pedido con la firma de George Fletcher & Company Ltd. por 20 cristalizadores y 15 bombas al vacío para uso en fábricas de azúcar de remolacha ya existentes, cuyo monto, según el Sr. C. W. Murray, presidente y director de la firma Fletcher, asciende a £150,000. Poco antes de colocar el pedido, un grupo de técnicos azucareros rusos visitaron dos fábricas de la British Sugar Corporation y los talleres de la George Fletcher & Company.

■

E. J. Culp—Presidente de la S.I.T.

En la 18ª Reunión Anual de Sugar Industry Technicians, Inc. celebrada el 10 al 12 de mayo en Nueva York, el Sr. E. J. Culp, director técnico de la American Sugar Refining Company, fue electo presidente de la S.I.T., quien pasa a ocupar el cargo del Sr. W. Austin Ciarno de Savannah.

El Sr. Culp también es socio de la American Chemical Society, el Institute of Food Technology, la American Association for the Advancement of Science, la Zerban Sugar Association, y es miembro y director del Comité Ejecutivo de Sugar Industry Technicians, Inc.

México Adopta el Sistema Métrico

Todas las mercancías embarcadas a México del exterior deben indicar el peso y el volumen de acuerdo con el sistema métrico. La Cámara Nacional de Comercio llama la atención a este requisito, que entra en vigor el 1° de julio, a fin de ayudar a los exportadores a evitar demoras y multas por falta de cumplimiento en el caso de embarques destinados para consumo en Mexico.

Lo que por una parte SE PIERDE . . .

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Ahora, con los precios del azúcar en descenso, es el momento propicio para obtener ganancia adicional en cada tonelada de caña. ¿Cómo? ¡No quemando el bagazo! Convirtiéndolo, en cambio, en pulpa de celulosa para hacer papel.
Celdecor ha demostrado año tras año que el bagazo es un combustible inadecuado y que es mucho más valioso en calidad de materia prima para convertirlo en papel. En las Filipinas, por ejemplo, uno de los 15 países donde el proceso Celdecor-Pomilio se encuentra en uso, un central que viene produciendo 15 toneladas diarias de papel de bagazo de alta calidad, pronto elevará su producción a 30 toneladas.
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Lluvia y Temperatura

(Viene de la página 51)

peratura en marzo fueron menos de lo normal. El rendimiento también fue menos de lo normal en tres de los cinco años, con un rendimiento de 3.21 toneladas por acre por debajo del promedio de 20 años. Solamente en tres años fue la precipitación de abril más de lo normal, cuando la temperatura en marzo fue menos de lo normal. En estos tres años, el rendimiento promedio fue 3.9 toneladas por acre sobre lo normal. Hubo cinco años en que la precipitación en abril fue menos de lo normal y la temperatura en marzo más de lo normal. En cuatro de los cinco años, el rendimiento promedio fue 2.39 toneladas por acre menos de lo normal. Toda la evidencia acusa mayor efecto por la precipitación en abril que por la temperatura en marzo, aunque la combinación de ambos factores acusa una correlación más alta que cada uno solo.

El estudio de las correlaciones no fue iniciado hasta que se obtuvieron los datos mencionados. Después de que se obtuvieron correlaciones significantes surgió la pregunta ¿por qué se encontró una correlación positiva para el mes de abril cuando la cosecha no está desarrollada y está creciendo lentamente, comparado con la segunda mitad del período vegetativo cuando la cosecha crece rápidamente? Una respuesta lógica es que cuando la precipitación en abril pasa de lo normal, pueden nacer más hijuelos, lo que da por resultado mayor número de cañas en el momento del corte. Aunque no se cuenta con datos sobre la densidad de población de caña, el supuesto que ofrecemos es perfectamente plausible.

Desde luego, hay muchos otros factores aparte de la precipitación y de la temperatura que afectan los rendimientos. Aunque la fertilidad del suelo a menudo es uno de los principales factores que afectan el rendimiento, ésta no se consideró importante en este estudio. La tierra fue adecuadamente abonada durante todo el período; si todas las demás condiciones hubiesen sido favorables, todos los años se obtendría una gran cosecha.

Resumen

Las correlaciones entre la precipitación mensual y el rendimiento de caña de la variedad C.P. 29-116 acusaron un valor *R* positivo significante para el mes de abril y un valor regular, aunque no significante, para septiembre. Las correlaciones entre la temperatura mensual y el rendimiento acusaron una correlación positiva significante para marzo y una correlación negativa de escaso significado para agosto.

Las correlaciones parciales significantes entre la precipitación y/o temperatura y el rendimiento de caña para abril y septiembre variaron muy poco de las correlaciones simples.

La correlación múltiple de la precipitación en abril y temperatura en marzo con el rendimiento acusó un valor *R* de .833, que es bastante superior al nivel de uno por ciento de significado. Estos datos demuestran que cuando la temperatura en marzo y la precipitación en abril pasaron de lo normal, el rendimiento de caña también pasó de lo normal. Por lo general, el rendimiento en caña también pasó de lo normal tanto cuando la temperatura en marzo o la precipitación en abril pasaron de lo normal.

■

La Sugar Research Foundation Invertirá $250,000

De acuerdo con un informe de su presidente, el Dr. H. B. Hass, la Sugar Research Foundation invertirá más de un cuarto de millón de dólares en estudios azucareros en Estados Unidos y en otros países. El programa, que abarcará gran diversidad de temas, se concentrará en tecnología alimenticia y usos no alimenticios para el azúcar. Dos de estos estudios se dedicarán a la higiene pública, y la Fundación hará otra aportación al Departamento de Nutrición de la Harvard School of Public Health. El nuevo presupuesto para el año fiscal que comienza el 1° de julio refleja el creciente énfasis de la Fundación en tecnología alimenticia. Aproximadamente una tercera parte de este presupuesto se invertirá en tecnología alimenticia, lo que equivale a bastante más de lo invertido en el pasado, dijo el Dr. Hass. Gran parte del trabajo costeado por la Fundación se está llevando a cabo en Cuba, el Canadá e Inglaterra.

■

Nuevas Centrífugas para Taiwan

La Taiwan Sugar Corporation colocó un pedido por 60 centrífugas con la Thomas Broadbent & Sons Ltd. de Inglaterra. Informan que el valor de este pedido pasa de £300,000 ($840,000). El Sr. W. Hallitt, vicepresidente de Broadbent, quien permaneció cierto tiempo en Taiwan, dijo: "Me causó mucha impresión el alto grado de pericia técnica y conocimientos de los ingenieros azucareros de Taiwan en la producción de azúcar, ingeniería mecánica e ingeniería eléctrica."

■

Examinando sacos de azúcar proveniente de Taiwan descargados en los muelles de la Maersk Line en Brooklyn, están el Sr. C. Chao, director del departamento comercial de la Taiwan Sugar Corporation, Taipei, Taiwan, y el Sr. Sandys Bao, director de la división azucarera de la Misión de Adquisiciones & Servicios del Gobierno de la China en Nueva York.

Las importaciones de azúcar de Taiwan, firme aliada de los Estados Unidos en el Pacífico, están limitadas por la cuota norteamericana. Las ventas de Taiwan en Estados Unidos son manejadas por la firma de B. W. Dyer & Company, economistas y corredores azucareros.

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EXTRACTOS — Presentados

en el

Décimo Congreso de la Sociedad Internacional de Tecnólogos Azucareros de Caña

Dr. O. W. Willcox, Editor

Agronomía

Recientes Adelantos en el Registro Agronómico de la Caña de Azúcar

H. F. CLEMENTS, *Décimo Congreso de la SITAC en Hawaii*

Desde el informe anterior a la SITAC en 1953 se han realizado nuevos estudios de varios aspectos del registro agronómico de la caña de azúcar, los que han culminado en ciertas modificaciones. En vez de calcular el valor de nitrógeno en la segunda estación, ahora, la suficiencia de abono nitrogenado se determina con respecto a un "índice normal" determinado para cada edad y nivel de humedad en las vainas de las cañas, refiriéndose a una tabla. La ecuación empleada para el cálculo de la tabla fue obtenida por un extenso estudio estadístico de registros agronómicos de cañaverales de alto rendimiento. Además de la determinación de nitrógeno normal, los estudios culminaron en la evolución de una acuación que se puede usar para determinar qué lectura de contenido de nitrógeno foliar se obtendría si la humedad y/o la edad de las vainas no fuesen lo que son.

Para obtener una guía más exacta en cuanto a la suficiencia de abono potásico, ahora, el contenido de potasio en las vainas se registra a base del nivel de K en la humedad de los tejidos en vez del peso seco libre de azúcar. La base K-H_2O ha absorbido las discrepancias ocurridas con el índice K.

Para reconciliar los efectos de los extremos en el contenido de humedad y vigor en el índice P, este índice fue normalizado para cierta humedad y nivel de azúcar, dando por resultado el Indice Fosfórico Normal. Ahora, los cañutos recientemente madurados (el quinto, contando del cañuto que aún tiene una hoja viva) también se analizan en cuanto al contenido de fósforo. Tanto el SPI como partes por cien mil, como el contenido de P del "quinto" cañuto en las mismas bases se multiplican para obtener una lectura de fósforo simplificada—el API. Hasta al presente, los resultados han sido buenos.

Ahora se está llevando a cabo un detenido estudio de los efectos del calcio y del pH, ya que los experimentos con cosechas recientes han acusado reacciones al carbonato de calcio en exceso de las anticipadas en el caso de calcio como nutriente. Los recientes estudios incluyen magnesio, azufre, silicio y los cinco elementos menores.

■

Efecto del Herbicida Silvex en Cañaverales de Louisiana

E. STAMPER y S. CHILTON, *Décimo Congreso de la SITAC en Hawaii*

El herbicida químico Silvex (2-4-5-T-P) se usó experimentalmente durante varios años en siembras de caña antes y después de la germinación en forma de aspersiones a razón de una libra por acre. Con el herbicida Silvex parece que se obtiene un aumento pequeño, pero constante, en rendimiento de caña por acre sobre el que se obtien con Dalapon o con 2,4-D y TCA en combinación. Esto es de sumo interés en el caso de Silvex, por tanto que resultó ser bastante menos eficaz en la represión del yerbajo Johnson que los otros herbicidas químicos.

Parece que no hubo diferencia significante en cuanto al rendimiento de azúcar por ciento caña. Tanto Silvex como Dalapon produjeron unas 400 libras más de azúcar por acre que los otros herbicidas.

Silvex, a razón de una libra por acre, aplicado a un tercio del área total tratada con distintos herbicidas, produjo excelentes resultados en la represión de "lechuga silvestre" (*Lactuca* sp.), una planta resistente al 2,4-D. Ningún otro herbicida resulto ser tan eficaz para la "lechuga silvestre" como Silvex, con excepción de aminotriazol a razón de una libra activa.

■

Evaluación de Herbicidas en el Cultivo de la Caña de Azúcar

E. ROCHECOUSTE, *Décimo Congreso de la SITAC en Hawaii*

Este escrito ofrece una reseña de los métodos de ensayo seguidos en Mauricio para determinar el valor de ciertos herbicidas para la represión de maleza en siembras de caña, y explica los distintos factores que este trabajo implica, como plano del terreno, tamaño de las parcelas experimentales, determinación de la población de maleza, y determinación de la maleza destruida y de los daños ocasionados a la cosecha. Se llama la atención a la forma práctica de acometer el problema y a las dificultades que este trabajo experimental implica.

■

Represión de Maleza con Herbicidas Químicos en Hawaii

N. HANSON, *Décimo Congreso de la SITAC en Hawaii*

La represión de maleza en la industria azucarera de Hawaii se inició en 1913. A continuación ofrecemos una breve cronología del avance y empleo de herbicidas por la industria desde entonces: Desde 1913 hasta 1940, el arsenito de sodio en agua fue el principal herbicida usado en cañaverales. En 1930 comenzó a emplearse el clorato de sodio, cuyo uso fue limitado debido al peligro de incendio. Aproximadamente al mismo tiempo se descubrió el CADE. En 1945 se introdujo el 2,4-D como un herbicida translocado, y para fines de represión antes de la germinación en 1947; el TCA de sodio para la represión de yerbajos en 1948; el CMU para fines de represión antes de la germinación en 1951; y el creciente uso de DCMU en

1953. El Dalapan de sodio comenzó a usarse generalmente en 1953 para destruir la hierba. Se han probado extensamente otros herbicidas, como aminotriazol, Silvex y Simazine, los que tal vez encuentren aceptación cuando se concluya el registro. El PCP se usa extensamente en CADE (emulsión diesel concentrada y activada) o ARCADE que emplea aceite aromático en lugar de aceite diesel. El aceite aromático se usa extensamente en regiones húmedas.

Los métodos de aplicación se han perfeccionado tanto durante los últimos diez años, que las aspersiones de herbicida a razón de 2.50 a 50 galones por acre son suficientes para contener la maleza eficazmente.

■

Informe Sobre el Desarrollo de Posturas de la Variedad P.T. en Hawaii

C. S. LOH, *Décimo Congreso de la SITAC en Hawaii*

Durante cincuenta años, las variedades de caña comerciales en Hawaii se componían mayormente de cañas blandas, por lo que se sufrían fuertes pérdidas cuando éstas eran azotadas por tifones o atacadas por el perforador de la caña. Por lo tanto, la propagación de variedades de cañas duras a fin de elevar la resistencia de la caña en pie y mantener el desarrollo potencial de las macollas es de gran importancia en cuanto al rendimiento de caña por hectárea.

Anteriormente, el reducido número de tallos de caña aprovechables en el momento del corte era el factor limitante en el rendimiento de caña en Taiwan. La enfermedad del mosaico y el "downy mildew" (hongo velloso) en la caña amenazaban la existencia de la industria azucarera de Taiwan. Una de las variedades de mayor rendimiento, la P.T. 43-52, había sido retirada de siembras comerciales debido a su susceptibilidad a la enfermedad del hongo velloso. La transferencia a esta variedad del gene o genes resistentes de variedades resistentes ha producido variedades desde moderadamente resistentes hasta muy resistentes a la enfermedad del hongo velloso así como a la enfermedad del mosaico.

La introducción de la variedad P.T. 51-11 hará que la industria azucarera de Taiwan pueda dedicar sus mejores tierras al cultivo de la caña. Las variedades P.T. 52-50 y P.T. 51-204 que se distribuirán este año (1959) también son prometedoras.

■

Propagación

Principios de Reproducción de Plantas Propagadas Vegetativamente

G. W. BURTON, *Décimo Congreso de la SITAC en Hawaii*

Las grandes empresas están invirtiendo cada día mayor parte de sus presupuestos en la evaluación del presente y del pasado, y en el estudio de tendencias con miras a prever el futuro. Los propagadores de plantas debieran hacer otro tanto, y este escrito fue preparado principalmente con esto en mente. Tal análisis debe ser objetivo y exento de prejucios, y debe basarse en realidades.

Un objetivo claro y bien delineado es esencial. Como cada objetivo agrava la complejidad del problema, el propagador debe preguntar en cada caso: (1) Si es compatible con otros objetivos, y (2) si es necesario. La ausencia de aristas, anteriormente un objetivo en la propagación de trigo, se ha probado que es incompatible con el rendimiento y, ya no es necesario. Por lo tanto, el estudio de los efectos de ciertas características

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en el rendimiento, utilizando la isogénesis o las "poblaciones isogénicas", a menudo se hace necesario.

El programa de propagación no es más malo ni mejor que la precisión del sistema de selección. Todo lo relacionado con el ambiente debe ser lo más uniforme posible. La selección inicial debe ser de aquellas características que presentan las más altas cualidades hereditarias. Es inútil tratar de alcanzar un aumento de 10% en rendimiento, puesto que si no puede ser medido, no se puede probar que se deba a la herencia. La búsqueda de nuevos métodos de selección jamás podrá terminar.

Se ha progresado mucho mediante la clasificación de grandes poblaciones híbridas de parentesco incierto sin conocimiento alguno de la genética, cualidades hereditarias ni componentes mutantes de los materiales y sistemas empleados. Se cree, no obstante, que cuando el propagador comprenda la genética de su material de propagación y limitaciones de sus sistemas de propagación y selección, logrará mayor progreso con relación al esfuerzo invertido.

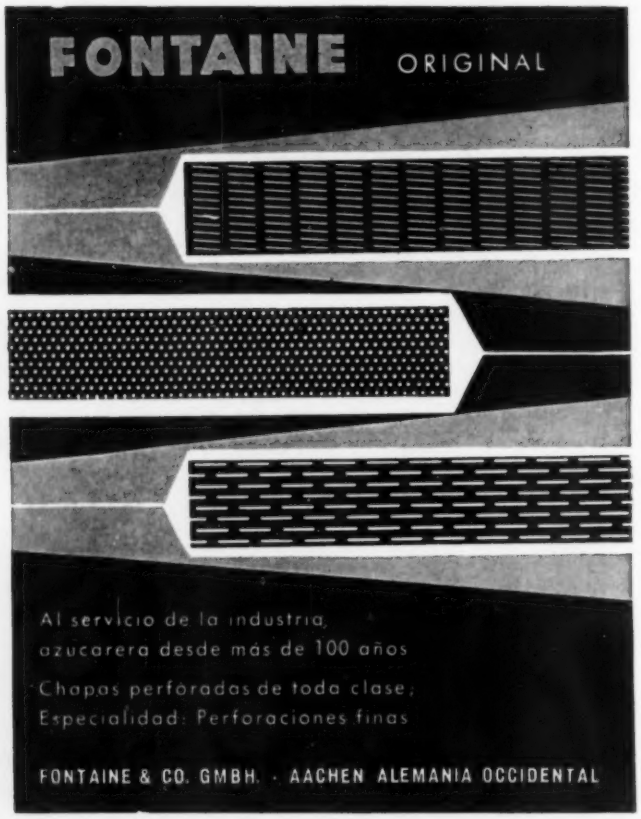
■

Fabricación

Célula de Saturación Mejorada y Tacho Experimental al Vacío

G. RUSH y C. MEREDYTH, *Décimo Congreso de la SITAC en Hawaii*

El escrito incluye una descripción de dos pequeñas piezas de equipo usadas para estudiar la cristalización de sacarosa. Se trata de una célula de saturación tipo Harman mejorado (4ta Memoria, 1932, Boletín 98) y un tacho al vacío de medio galón.



La célula de saturación fue provista de un regulador de temperatura automático, el cual es una mejora sobre el regulador manual previamente descrito.

El tacho de medio galón fue instalado hace cerca de 25 años. Las modificaciones introducidas lentamente a medida que se obtuvo más experiencia y que aumentaron las exigencias han dado por resultado una pieza de equipo muy adaptable y sumamente útil que no parece tener paralelo en otros laboratorios azucareros.

■

Desarrollo de Cristales de Sacarosa

H. E. C. POWERS, *Décimo Congreso de la SITAC en Hawaii*

Parece que gran parte de los trabajos publicados sobre el desarrollo de cristales de sacarosa asumen tácitamente que bajo condiciones normales de pureza, sobresaturación, etc., la velocidad de desarrollo será igual para todos los cristales, lo que no es cierto. Aunque se encuentren en la misma solución, algunos cristales se desarrollan rápidamente y otros lentamente. Algunas partes (superficiales) de una cristal se desarrollan más rápidamente que otras. Hasta en una sola parte de un cristal ocurren oscilaciones en la velocidad de desarrollo.

Dado que "la velocidad de desarrollo depende en gran parte de la reacción interfacial en vez de la difusión, viscosidad, etc." (van Hook), un estudio de esta reacción superficial podría revelar modos de acelerar la velocidad general de desarrollo considerablemente. El autor describe nuevos métodos concebidos para esclarecer el mecanismo del desarrollo. Los cristales individuales se desarrollan bajo condiciones reguladas, cuya acción se observa bajo el microscopio, empleando la fotografía, cinemicrografía, etc. para registrar el desarrollo. Hasta cierto punto, la velocidad de desarrollo está relacionada con el grado de perfección de la forma del cristal. Estos métodos facilitan el estudio de este tema, especialmente de la forma de producción de inclusiones de licor madre y materia extraña. El escrito concluye con varias notas sobre ciertos temas poco conocidos, como la nucleación, así como la solubilidad y desarrollo del cristal de tamaño submicrómico.

■

Formación de Grano Falso y Sus Efectos

A. C. RAHA, *Décimo Congreso de la SITAC en Hawaii*

La presencia de grano falso en la masa cocida presenta muchas dificultades. Estas dificultades han sido explicadas a la luz de la ecuación de Poiseuille, y se ha tratado de explorar este asunto.

■

Estudios Calorimétricos de la Cristalización de Sacarosa

N. NAPPER y A. E. ALEXANDER, *Décimo Congreso de la SITAC en Hawaii*

Para el desarrollo de cristal—que implica gran número de cristales pequeños, se puede demostrar que la velocidad de cristalización (expresada como masa cristalizada/unidad superficial/unidad de tiempo) es directamente proporcional a la velocidad de aumento en la temperatura de la solución en proceso de cristalización. Bajo condiciones experimentales adecuadas, el aumento puede llegar hasta 0.03° C/min. Por el método descrito, la velocidad de aumento en temperatura fue medida por un *thermistor* (resistencia térmica) con un coeficiente de resistencia térmica de 150 ohm/grado C a 25° C.

Se utilizó el simple microcalorímetro descrito por Hutchinson y White (1955). Se compone de un frasco *Dewar* bien tapado con corcho, sumergido en un termóstato que se mantiene a 25.0 ± 0.2° C, cuyo primero contiene unos 25 ml de sacarosa en solución, la que puede ser agitada por un agitador de cristal que atraviesa el tapón de corcho. El *thermistor* (S.T.C. Tipo A5321/100) fue suspendido en una posición fija en la solución, formando un brazo del puente Wheatstone en el que las diferencias de 0.1 ohm fueron fácilmente medidas. La velocidad de aumento en temperatura, producido por la rotación del agitador en el medio viscoso, fue primero determinada a intervales convenientes. Entonces se le agregó a la solución una cantidad adecuada de semilla en forma de sacarosa finamente fraccionada y suspendida en n-butanol, y se volvió a medir la velocidad de aumento en temperatura.

Para los pequeños aumentos en temperatura implicados, el cambio de resistencia del *thermistor* fue directamente proporcional al cambio de temperatura en la solución. La velocidad relativa de la cristalización (expresada en ohm/min) se obtuvo del registro del cambio de resistencia contra el tiempo. Este método se usó para determinar la velocidad relativa de cristalización a coeficientes de subresaturación (por ciento peso) de 1.02 y más. El valor óptimo para estudiar el efecto de aditivos en la velocidad relativa fue alrededor de 1.10. Los resultados de reproductividad fueron de 3 a 5%.

Este método también se usó para estudiar el efecto de distintos aditivos en la velocidad relativa de cristalización de sacarosa.

■

Velocidad de Desarrollo de Cristales de Sacarosa a Sobresaturaciones Muy Bajas

A. y W. A. VAN HOOK, *Décimo Congreso de la SITAC en Hawaii*

La medición de la velocidad de desarrollo de cristales de sacarosa a sobresaturaciones muy bajas es de interés ante la posibilidad teórica de sobresaturaciones críticas, la justificación de la extrapolación de valores a cero por valores de solubilidad, y la interpretación de mediciones saturoscópicas. Tales determinaciones (en el límite de 30° C) indican que la relación entre la velocidad de desarrollo y conductancia molar es lineal desde varios enteros por ciento de sobresaturación hasta 0.1% (⌒ 0.1° C de superenfriamiento). Por la inyección de pequeñas cantidades de agua y pequeños cambios de temperatura a un grado de concentración fijo, se obtuvieron diversos potenciales de desarrollo a temperaturas constantes. Ocurrió un marcado declive lineal al entrar en la región subsaturada. Los resultados sugieren que el patrón lineal se puede alterar a 0° C.

■

Componentes No-Sacarosos en Crudos de Hawaii

CHEN-CHUAN TU y KENNETH ONNA, *Décimo Congreso de la SITAC en Hawaii*

La separación parcial de sacarosa se logró por cristalización, usando metanol como solvente. Se obtuvieron siete grupos de componentes no-sacarosos y se identificaron como sigue: (1) pigmentos vegetales que ocurren naturalmente; (2) productos de hidrato de carbono termodegradados; (3) productos de hidrato de carbono álcali-degradados; (4) productos de la interacción molecular de aminoácidos y productos de (2) y (3); (5) azúcares simples y oligosacáridos; (6) aminoácidos; y (7) compuestos inorgánicos. La mayoría de estas substancias han sido provisionalmente identificadas por análisis cromatográfico y por electrofóresis. Se cree que la presencia de componentes no-sacarosos en los cristales de azúcar crudo ocurre principalmente por oclusión.

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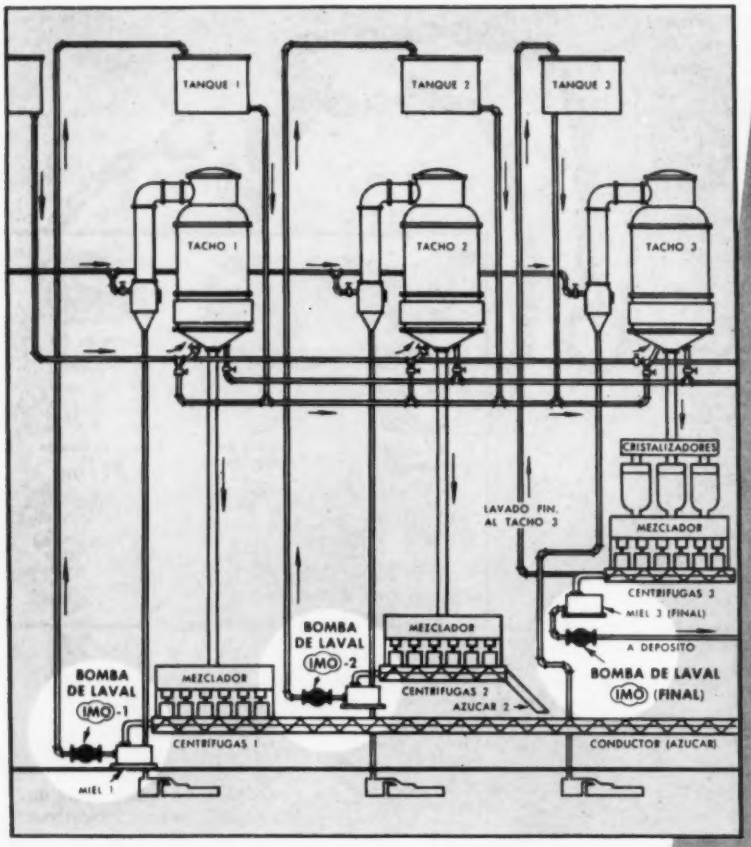

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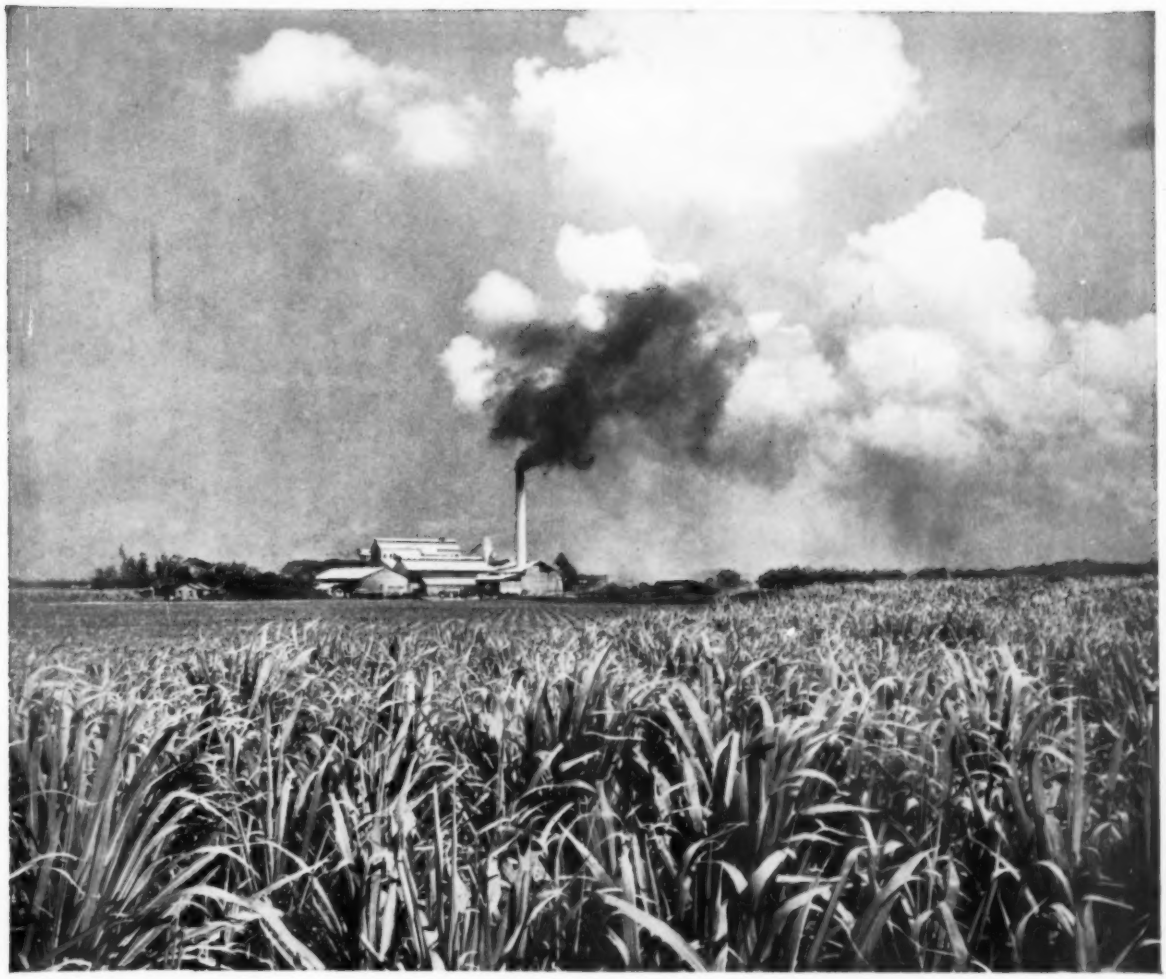

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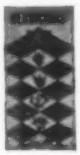

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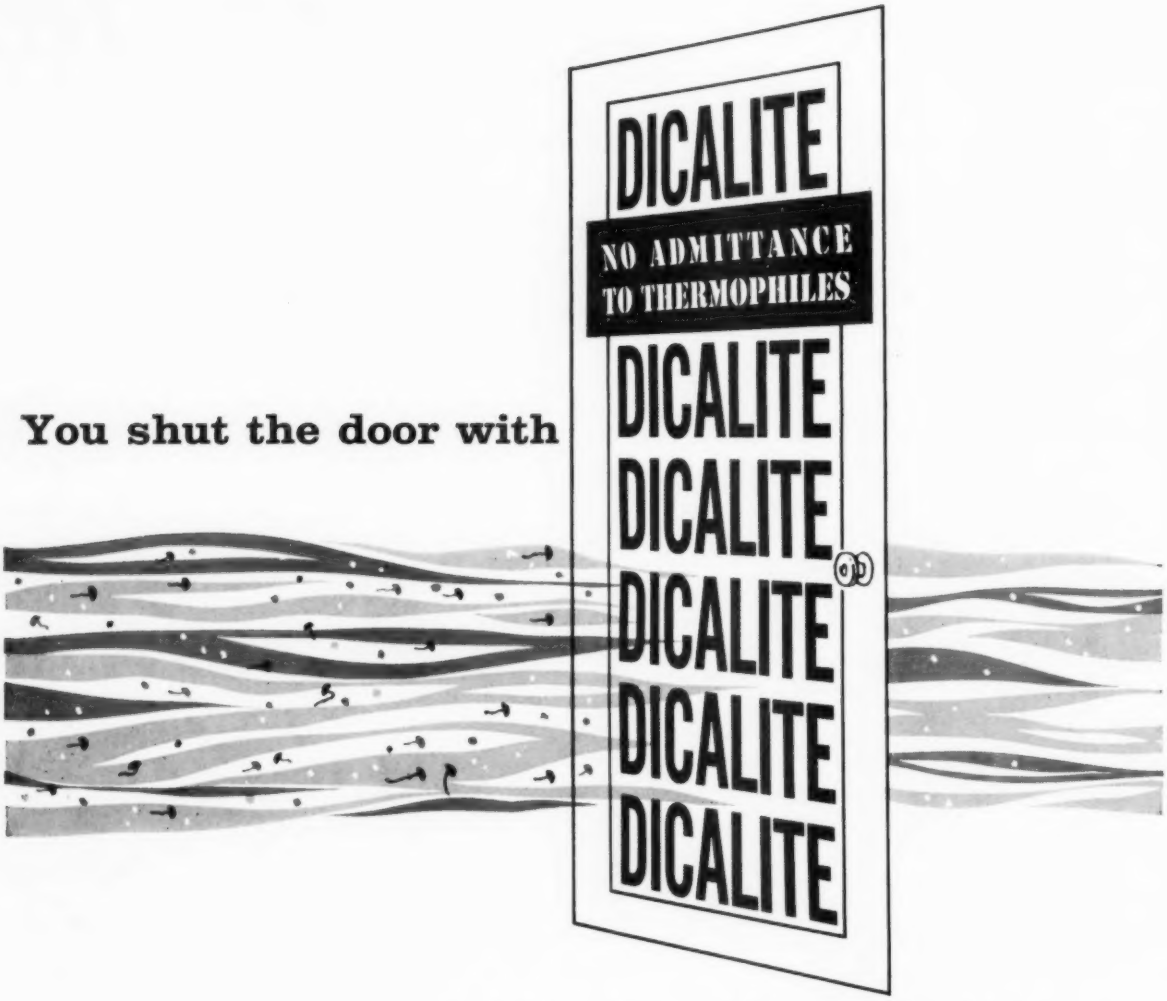

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